Reviewed: 9/24/91
Recommend: L
by G. Ferreira

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SITE INSPECTION

BENDIX-TETERBORO FACILITY

AKA: ALLIED-SIGNAL INC.

AKA: ALLIED BENDIX AEROSPACE

TETERBORO, BERGEN COUNTY

EPA ID # NJD078714433

New Jersey Department of Environmental Protection and Energy
Division of Responsible Party Site Remediation
Bureau of Site Assessment

BENDIX-TETERBORO FACILITY
AKA: ALLIED-SIGNAL INC.
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ROUTE 46
TETERBORO, BERGEN COUNTY, NEW JERSEY
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GENERAL INFORMATION AND SITE HISTORY

Bendix is a research, engineering, design and manufacturer of aerospace electronic systems for both the military and commerclal sectors. The 71-acre facility, listed as Block 202, Lot 4, is situated in an area characterized by a mixture of industrial, commercial and residential uses. The site is bounded to the north by Route 46, to the west by Route 17, to the east by Industrial Avenue and to the south by the properties of Metpath Inc. and the Sumitomo Machinery Corporation of America. The complex consists of several manufacturing buildings and fifteen support buildings.

Bendix purchased an 101-acre vacant lot in 1937 from the Riser Land Company and constructed a new facility encompassing 400,000 square feet. In 1941 Bendix sold a large portion of the property to the U.S. Department of Defense (Navy) to build and operate a foundry for the production of magnesium and aluminum castings. In addition to the foundry, the Navy site included a sanitary sewage treatment facility and a small document incinerator. Bendix acquired the property back from the Navy in 1961, ceased the foundry operation in 1968, and converted the property for use as office space in 1969.

In 1977 Bendix sold 22 acres of the southwestern portion of the property to Metpath Inc. and Sumitomo. The properties purchased by Sumitomo contained the Navy's former sewage treatment facility and document incinerator. The transfer of the remaining 71 acres of the property from the Bendix Corporation to the Allied-Signal Company occurred in 1985. The subsequent transfer triggered an investigation under the Environmental Cleanup Responsibility Act (Case #86914), which continues to the present day.

There are approximately 200,000 residents within a 4-mile radius of the facility, with the nearest residence 1 mile away.

SITE OPERATIONS OF CONCERN

The facility manufactures and assembles electronic instruments and guidance systems for aerospace and military applications. Present plant operations consist primarily of the assembly of purchased components. Manufacturing is limited to the production of printed circuit boards and selected metal parts machined from bar stock or metal castings manufactured by outside sources.

Substantial areas of the facility are devoted to engineering for flight, navigation and guidance systems. The limited manufacturing operations are done in batch mode and are primarily assembly operations.

The facility includes six major areas of operation;

1. Main Building - Approximately 435,000 square feet of building space are devoted to general and administrative offices, computer operations, employee cafeteria, metal machining area, electronic assembly areas, a metal plating facility, printed circuit board assembly area, a small suite dedicated to beryllium operations and a series of "clean rooms" for assembly of precision electronic components.

2. Engineering Building and Extension - Approximately 172,000 square feet of building space are used for the engineering development of in flight, guidance and navigation systems. Approximately 90 percent of these two buildings are offices and a general engineering area. The remaining 10 percent is largely devoted to "clean rooms" and two support laboratories.

3. Plant 4 and 5 - These interconnected buildings total approximately 179,000 square feet and are located along the western property line, south of the Main Building. Building 5 currently contains offices with the exception of a micro-circuitry assembly area in the northwest corner of the building. Plant 4 was a foundry until approximately 1968. It is currently used for engineering, research, and manufacture of automated inspection and testing stations for aerospace electronic flight, guidance and control systems.

4. Materials Storage (Active) and Waste Treatment Area - This area, located between the Main Building and the employee parking lot, includes approximately a dozen small buildings for storage of both hazardous and non-hazardous materials used throughout the facility. It also contains the plant's industrial wastewater treatment plant, and the hazardous waste drum storage building and storage buildings for plating chemicals, general chemical stocks, paints, lubricating oils and greases and electric truck batteries. The wastewater treatment plant includes a Modern Lancy Treatment System for metal plating wastes.

5. General Storage - (Inactive) - A cluster of ten small buildings located at the southern end of the property adjacent to the employee parking lot is used to store inactive company records, engineering test equipment, tooling and maintenance partitions. There are no chemicals or liquid storage within these buildings.

6. Powerhouse Area - The facility has a steam generating plant at the southwest corner of the Main Building. Four oil-fired boilers are supplied with #6 and #4 fuel oil from five underground tanks located immediately north of the Powerhouse. The plant provides heating for buildings throughout the facility.

The major volume of process waste is industrial wastewater generated from the electroplating and printed circuit board operations in the Main Building. Concentrated acids, caustics, cyanide-bearing wastes and chrome rinse wastewaters are treated in an on-site treatment plant. Treated wastewater is discharged to the county sanitary sewer system. Sludge resulting from the wastewater treatment is shipped off site under manifest as a hazardous waste.

Other wastes generated on site include solvents from the cleaning rooms, solvents and paint residues from degreasers and paint booths and a small quantity of acids and alkalines from the laboratories. These wastes are stored in 55-gallon drums for less than 90 days in a fully enclosed, concrete curbed, explosion proof building. The plant uses only virgin solvents and has no current on-site waste disposal operations. Solvents are manifested and shipped off site to be recycled when possible.

Floor drains in the process areas of the plant were sealed at an undisclosed date. The only remaining drains are located in the bathroom areas, all of which connect to the sanitary sewer lines. Floor trenches are present in two plant areas, the electroplating area and the printed circuit board operations area. Both of these trench systems are connected to the on-site wastewater treatment plant.

Hazardous raw materials are stored or in use at the following six areas of the plant:

1. Printed Circuit Board Area (Main Building) - Contains solvents and adhesives used in manufacturing and assembling electronic circuit boards.

2. Metal Plating Area (Main Building) - Contains metal electroplating chemicals, acids and alkalines.

3. Chemical Stocks Storage Area and Oil & Chemical Storage Building- Storage of specialized oils, adhesives and select chemicals used in the printed circuit board manufacturing processes.

4. Chemical Storage Building - Storage of chemical stocks and plating materials.

5. Chemical Storage Shed - Storage of chemical stocks and plating materials.

6. Hazardous Waste Drum Storage Building - This 3,000 square-foot building includes storage for several hundred drums on a diked reinforced/concrete pad. Materials such as acids, alkalines, cleaners, degreasers, oils, paints and solvents are stored for less than 90 days.

In addition to these areas, small quantities of hazardous materials are in use or storage at clean rooms and one small spray paint area in the plant. Working quantities of solvents are stored in metal safety cans. Degreasing solutions are recovered in drums at the satellite location of generation.

In the past, beryllium machining was done in an isolated area of the main building. In 1981 and 1982 these operations were discontinued with the exception of a small maintenance facility retained to provide replacement parts for materials currently in service. This beryllium room has restricted access and a separate air handling and filtration system to contain any metal dust that may be present.

The facility filed a RCRA Part A application in 1980 to operate as a Treatment, Storage and Disposal (TSD) facility. While operating as a TSD facility, the following storage tanks were in service:

ABOVEGROUND

CAPACITY (GAL)	CONTENT
(1) 10,000	#2 Fuel Oil
(1) 2,000	#2 Fuel Oil
(1) 4,000	Cupric Chloride
(1) 250	#2 Fuel Oil

BELOW GROUND

CAPACITY (GAL)	CONTENT
(4) 25,000	#6 Fuel Oil
(1) 25,000	#4 Fuel Oil
(1) 6,000	Solvent
(1) 8,000	Waste Oil
(1) 5,000	Waste Oil
(1) 6,000	Waste Oil
(4) 550	Fuel Oil
(1) 2,500	Fuel Oil
(2) 30,000	Fuel Oil

As part of the facility's effort to attain "Generator Only" status, all of the below ground storage tanks with the exception of the four 25,000-gallon fuel oil tanks were removed in 1985 in accordance and acceptance of NJDEP regulations. Other aboveground storage tanks currently in use are three 275-gallon tanks used to store diesel fuel and one 4,250-gallon tank used to store Genosolv-D. All of the tanks are equipped with a secondary containment system.

The facility's on-site treatment system is almost fully automated. Segregated waste streams of diluted waste rinse water from the plating and printed circuit board operations are treated here. Rinse waters entering the system are segregated into four streams: general rinse water from acid pickling and alkaline cleaner tanks, cyanide rinse water, chromate rinse water and chelated rinse water. General rinse water flow, which contains acid, alkali and heavy metals, is piped from a lift station directly to a neutralization tank where the pH is adjusted by adding a lime slurry. The effluent then flows by gravity into a flocculation tank where polyelectrolyte is added, and into a clarifier where the solids settle to form a sludge blanket as the effluent flows upward through the blanket. Clarified effluent water, now containing less than 3 parts per million (ppm) of metals, flows from the top of the clarifier into a sump for final pH adjustment.

Before being discharged to surface water, the clarified water flows through a final effluent monitor (FEM) which continuously records pH. The FEM also monitors and totalizes flow and collects a 24-hour composite sample proportional to flow. All measurements are recorded on a 30-day strip chart housed in the FEM module.

The second of the four rinse lines, the cyanide stream, undergoes a two-stage treatment as it flows through the treatment system. In the first stage, cyanide is oxidized to cyanate by reaction with hypochlorite. The effluent then enters a second-stage treatment tank where additional hypochlorite oxidizes the cyanate to carbon dioxide and nitrogen. From the second stage tank the effluent then joins general rinse water in the neutralization tank.

The chromium rinse line, which contains approximately 50 ppm of hexavalent chromium, is reduced with the addition of sodium bisulfite and sulfuric acid, converting it to a less toxic trivalent chromium before it flows into the main neutralization tank.

Chelated rinse water undergoes a first stage treatment with sulfuric acid and ferrous sulfate to displace the chelated copper. A second stage treatment with lime and calcium polysulfide precipitates the copper as a hydroxide and sulfide. The treated chelate then flows to a flocculation tank and clarifier, from which the clarified effluent drains into a sump for final pH adjustment.

In addition to the four rinse streams, floor spills containing concentrated acids from the plant's plating operations, are batch treated with chromate-reducing chemicals and lime before being transferred to sludge thickening tanks.

The sludge that forms at the bottom of the two clarifiers is also pumped to sludge thickening tanks. The interval and duration of sludge pumping can be varied to provide for an optimum sludge blanket.

Two sludge thickening tanks accommodate the heavy metals removed from the waste stream at the plant. Sludge from the clarifiers is approximately 4 percent solids by weight. Decant panels in the thickening tanks bring the sludge up to 12 percent solids. From the tanks, the sludge is fed to a filter press, three to four times a year. An average 5,500 to 6,500 gallons of sludge is processed per press run, resulting in approximately 18,000 pounds of filter cake with a 30 to 40 percent solids content. The drummed sludge is then transported to an approved landfill site in South Carolina.

Water from the filter press as well as decant from the thickening tanks return to the final pH adjustment sump to join the effluent from the clarifiers.

On June 5, 1984, during a routine excavation for a new building, an oily liquid mixed with water began to seep from a portion of the excavation area. The seepage was in the vicinity of a below ground hexane tank which was no longer is use. Bendix took immediate action to contain the liquid and subsequently instituted a groundwater monitoring program which included the installation and periodic sampling of monitoring wells.

A transformer pad, which contained three 750-gallon polychlorinated biphenyl (PCB) transformers, was dismantled in 1985.

In February 1990 Ebasco Services Incorporated (Ebasco) of Lyndhurst, New Jersey was contracted to conduct a sampling program on the Teterboro Facility in response to Directives issued on February 1, 1990 and December

13, 1990 by the New Jersey Department of Environmental Protection (NJDEP). The sampling program was implemented in accordance with the "Final ECRA Chemical Field Sampling and Analysis Plan (FSP Plan)-Allied-Signal Property" and the Supplemental Field Analysis Plan as approved by the NJDEP Industrial Site Evaluation Element, Bureau of ECRA Applicability and Compliance on February 16, 1990.

As described in the FSP, the field investigation performed at the Allied-Signal was separated into 13 specific areas of concern.

Area 1 - Chemical Storage Area
Area 2 - Waste Solvent Storage Tank
Area 3 - Waste Oil/Solvent Storage Tank
Area 4 - Jet Fuel Storage Tank
Area 5 - Hazardous Waste Storage Area
Area 6 - Powerhouse Fuel Storage Area
Area 7 - Foundry Storage Area
Area 8 - Plant 4 Receiving Area
Area 9 - Plant 5 (East)
Area 10 - Fuel Oil Storage Area
Area 11 - West Drainage Ditch & Boiler Blowdown Outfall
Area 12 - Equalization Ditch
Area 13 - Eastern Ditch

A comprehensive sampling and analysis program was conducted in June 1990 in order to delineate the horizontal and vertical extent of soil contamination and to determine the likelihood of these contaminants entering the groundwater and nearby surface water.

The Department of Energy is currently conducting a project to decontaminate the former Maywood Chemical Company site in Maywood, New Jersey and associated properties in the vicinity of the Allied-Signal facility. As part of the investigation, a mobile gamma scan was conducted and some anomalies were identified on Allied-Signal property and properties owned by Sumitomo and Metpath. It was determined that residual radioactivity was primarily due to elevated levels of thorium and radium and their associated decay products in the soil as a result of possible disposal activities from the Maywood facility. These anomalies were also to be addressed in the overall site investigation and cleanup plan.

GROUNDWATER ROUTE

The facility is underlain to a depth of greater than 100 feet by the Triassic and Jurassic rocks of the Newark Group as well as glacial deposits of Pleistocene age. The Newark Group consists of three formations referred to as the Stockton, Lockatong and Brunswick. The glacial deposits of the Pleistocene overlie the Brunswick Formation which overlies the Lockatong and Stockton Formations. Surficial deposits have been identified as approximately 4 to 7 feet of silty, fine to medium gray sand underlain by a uniform and horizontally extensive, dense, laminated clay interbedded with very thin silt lenses. This confining layer of clay exceeds 160 feet in thickness, limiting the shallow water table to the overlying silty sands.

The water table is found at shallow depths of 2 to 5 feet with groundwater flow estimated to be locally toward the boundary drainage channels found on the east and west sides of the plant. On a regional scale, the direction of groundwater flow in the unconsolidated deposits is estimated to be east-southeast toward the Hackensack River.

The monitoring well installation and sampling program focused on the Chemical Storage Area, Waste Solvent Tank Area and Waste Oil/Solvent Tank Area where 21 monitoring wells were installed in 1984 to a depth of 5 to 8 feet below grade. One round of groundwater sampling was conducted in June 1990 by Ebasco Environmental of Lyndhurst, New Jersey, for analysis of volatile organic compounds (VOCs), acid extractables (AE), base/neutral compounds (BN), total petroleum hydrocarbons (TPH) and priority pollutant metals (PPM). Contaminants found in the groundwater were primarily VOCs such as vinyl chloride, 1-1-dichloroethane and trans-1,2-dichloroethene. The contaminated groundwater plume is defined as ah area of 250 feet by 500 feet and is estimated at 4,000,000 gallons. Allied-Signal is currently reviewing applicable treatment technologies for volatile organic and petroleum hydrocarbon contaminated groundwater. These technologies include air stripping, steam stripping, activated carbon adsorption, ion exchange, oxidation/aeration and freeze crystallization.

Several municipalities withdraw water for potable use from the Brunswick Formation, with wells drilled to an average depth of 400 feet. The geologic atlas sheet lists 31 public supply wells, 32 industrial wells, 1 test well and 16 unsuccessful rock wells within a 4-mile radius of the site. The public wells are as follows:

OWNER	DATE INSTALLED	DEPTH (feet)	FORMATION *
Lodl Dept. of Public Works	No date	450	Trb
Boro of Elmwood Park	1954	200	Trb
Boro of Wallington	No date	400	Trb
City of Garfield	1966	475	Trb
City of Garfield	1967	400	Trb
City of Garfield	No date	273	Trb
City of Garfield	No date	320	Trb
City of Garfield	No date	165	Trb
City of Garfield	No date	326	Trb
Boro of Lodi	No date	403	Trb
City of Garfield	1968	405	Trb
Boro of Lodi	No date	300	Trb
Boro of Lodi	No date	Not listed	Trb
Boro of Lodi	No date	200	Trb
Lodi Dept. of Public Works	1965	510	Trb
Boro of Lodi	No date	Not listed	Trb
Boro of Lodi	1954	459	Trb
Boro of Lodi	No date	Not listed	Trb
Lodi Dept. of Public Works	1965	450	Trb
Boro of Lodi	No date	Not listed	Trb
Boro of Lodi	1966	470	Trb
Boro of Lodi	No date	350	Trb
Hackensack Water Co.	No date	189	Q
Hackensack Water Co.	1954	168	Q
Hackensack Water Co.	1955	190	Q
Bowler City	1958	400	Trb
Boro of Wallington	1965	400	Trb
Boro of Wallington	No date	300	Trb

OWNER	DATE INSTALLED	DEPTH (feet)	FORMATION *
Hackensack Water Co.	1955	263	Q
Bogota Water Co.	No date	275	Trb

* Trb = Triassic Brunswick Formation
* Q = Quaternary

Ther site does not pose a threat to private potable wells in the vicinity of the site as the entire population of Teterboro (27) is serviced by public supply wells. The exact number of private wells in use within a 4 mile radius of the facility is not known.

The shallow groundwater flow on site is confined to the upper 5 feet of relatively permeable sediments by a thick layer of clay which reduces the potential migration of contaminants into the deep aquifer zones.

SURFACE WATER ROUTE
Physiographically, the area is characterized by low-lying, flat topography at an elevation of less than 10 feet above mean sea level. The site is located within the Hackensack River Basin, and is drained principally by Berry's Creek situated approximatley 100 feet to the east. Berry's Creek, running adjacent to the site, empties into the Hackensack River 2.0 miles to the east. The Hackensack River flows to the north and empties into the Oradell Reservoir 7 miles down stream. The river is used for primary and secondary contact recreation as well as the maintenance and migration of fish and wildlife.

Parallel to the eastern and western facility boundaries are two storm water drainage ditches (channels) which serve as part of the Bergen County drainage system. At present these ditches are used to collect and channel surface water runoff directly and/or piped discharge lines located throughout the facility, as well as from areas upgradient of the facility. The eastern and western storm water drainage ditches are connected by three subsurface, east-west trending equalization ditches which serve as overflow lines between the two boundary channels.

There is one surface water intake point 7 miles downstream of the site. The intake, referred to as the Haworth Water Treatment Plant, is situated along the Oradell Reservoir and serves approximately 750,000 residents in Bergen and Hudson Counties. The plant has a maximum capacity of 200 million per day and treats with ozone, filtration and chlorination.

The facility had five surface water discharges under NJPDES permit #0002097 (DSN 002A, 003, 004, 005 and 006) to Berry's Creek and two discharges to the Bergen County Utilities Authority (BCUA) (DSN OOIA and 002B). The discharges can be described as follows:

> DSN 001 consists of noncontact cooling, sanitary, tumbling and boiler blowdown waters which discharge to the BCUA at a flow rate of approximately 0.1 million gallons per day (MGD).
>
> DSN 002A consists of treated plating wastes resulting from electroplating, anodizing and chemical treatment of various metals, and cleaning, processing and plating of copper and lead-tin on printed

circuit boards. The average flow is approximately 0.04 million gallons per day (MGD). DSN 002B consists of the same effluent as DSN 002A; however, the discharge will go to the BCUA. DSN 002A is an emergency discharge which is activated only when the permittee is unable to discharge to the BCUA.

DSN 003, 004 and 005 consist of noncontact cooling water from air conditioners, compressors and pumps. The average flows are 0.104, 0.045 and 0.019 MGD, respectively.

DSN 006 is the outfall for the storm water collection system. Noncontaminated storm water runoff is collected (from roofs, roadway, parking area and grounds) and discharged through 35 separate outfalls into an adjacent drainage ditch which empties into Berry's Creek.

A total of ten sediment samples were collected by Ebasco of Lyndhurst, New Jersey on March 23, 1990 from the Western Drainage Ditch, the Eastern Drainage Ditch and the Equalization Ditch to evaluate the impact of past industrial wastewater discharges (DSN 001, 002, 003 and 005). Samples were analyzed for VOCs, BNs, PP metals, TPHs and cyanide. Contaminants found in the ditches such as chromium, copper, lead, nickel, silver, zinc, petroleum hydrocarbons and Aroclor 1248 are suspected to have originated from an off-site source. Cleanup of the portion of the ditch next to the Allied facility would not significantly improve the quality of the streams, since documented upgradient contamination in the ditches and from surrounding off-site soils would probably recontaminate the portion of the ditches crossing the Allied property. Sediments in the Equalization Ditch are transported from the Eastern and Western Drainage Ditches as flow equalizes in the two ditches. If sediments in the Equalization Ditch were removed, it would quickly silt up with contaminated off-site materials again. The sources of contaminated materials in the Equalization Ditch are off-site sediments such as those transported from the Great Bear Oil Spills. Therefore, the cleanup of the Western Drainage Ditch (Area 11), Equalization Ditch (Area 12) and Eastern Drainage Ditch (Area 13) within Allied's property were not proposed in Allieds Cleanup Plan.

There is a small unnamed freshwater wetland approximately one hundred feet to the northwest of the facility.

AIR ROUTE

The facility operates with approximately ten air permits, some of which regulate top vapor surface cleaners equipped with a local exhaust ventilation system venting directly to the atmosphere. Other permits regulate the emissions associated with the facility's Nebraska Boiler. These permits are regulated by the NJDEPE, Division of Environmental Quality, Air Pollution Control Permit Program, Bureau of New Source Review.

Prior to 1967 Bendix burned wood, grease and magnesium chips in open pits, which may have resulted in the release of toxic fumes.

There were no incidents of releases or odor complaints on record at the respective state and local government agencies. The potential for a release to occur is low as the facility is predominantly research, design and assembly.

SOIL

Area soils include a horizontally extensive deposit of laminated fine silts and clays, overlain by a cover of mixed fine to coarse silty sands. The facility is underlain by 3 to 12 feet of structural fill which is primarily composed of a brown coarse to fine grained sand, with lesser amounts of silt and gravel. The organic rich Holocene sediments are present beneath the fill in a 2- to 3-fobt thick layer throughout the site.

Soil samples were collected in June 1990 by Ebasco from each of the areas of concern designated in the ECRA Cleanup Plan and analyzed for VOCs, BN, PP Metals and petroleum hydrocarbons. The results Indicate the following areas of contamination:

Area 1 - The Chemical Storage Area exhibited a limited areal extent of VOC and BN contamination slightly above the action levels. Cadmium (max. 27 ppm), copper (max. 180 ppm) and mercury (max. 38 ppm) were detected in the soil at concentrations above action levels in isolated samples. TPHs were also detected in the soil which appear to be attributed to the ubiquitous presence of near surface oil stained soil.

Area 2 - One isolated sample in the Waste Solvent Storage Tank area (WT-04) was contaminated with trichloroethene, tetrachloroethene and 1,1,1-trichloroethene at concentrations above the action levels. TPHs were found above the action level in two soil samples collected from this area.

Area 3 - Two soil samples from borings OS-02 and OS-04 in the Waste Oil/Solvent Storage Tank area exhibited elevated levels of toluene, ethylbenzene and xylene at a depth of 10 to 10.5 feet and 4 to 4.5 feet, respectively. TPHs were detected in soil samples OS-01 (max. 120 ppm) and OS-04 (1,300 ppm) above action level (100 ppm). Compounds detected with the largest concentrations included: 1,1,1-trichloroethene (0.53 to 1.6 ppm), m-xylene (0.33 to 37 ppm), tetrachloroethehe (0.063 to 4.7 ppm), o,p-xylene (5.3 to 25 ppm) and toluene (0.69 to 19 ppm).

Area 5 - Several soil samples in the Hazardous Waste Storage Area had exhibited metals (antimony, arsenic, beryllium, copper, mercury, nickel and zinc) and VOCs above action levels.

Area 6 - Samping in the Powerhouse Fuel Oil Storage Tanks delineated a contaminated area of approximately 35 feet by 25 feet to a depth of approximately 14 feet outside the tank farm and a contaminated area of approximately 35 feet by 25 feet to a depth of approximately 6 feet under the tanks. A total of approximately 650 cubic yards of soil was contaminated with TPHs in the range of 1,000 to 200,000 parts per billion (ppb) and polycyclic aromatic hydrocarbons in the range of 10 to 37.4 ppb. The tank replacement occurred in 1991. The Cleanup Plan to excavate and remove the TPH-contaminated soil was implemented in conjunction with tank removal and replacement.

Area 8 - Sampling in the Plant 4 Storage Area and Area 10 Fuel Oil Storage Tank are delineated an area of approximately 12,000 square feet by 4 feet deep contaminated with TPH in the range of 1,000 to 46,000 ppb and BNs in the range of 10 to 300 ppb. A total estimate of 1,780 cubic yards of TPH contaminated soil would require remediation.

Soil contamination on site indicates metals and VOCs scattered in the unsaturated zone (1 to 2 feet) above the contaminated groundwater area. Since most of the area is either paved or covered by buildings, a combined soil and groundwater remediation program such as in-situ soil flushing has been recommended. The proposed cleanup method (GHEA Process with surfactant extraction) is capable of removing metals, VOs, BNs and TPH contaminants in compliance with applicable or relevant and appropriate requirements (ARAR).

DIRECT CONTACT

As the facility is a defense contractor for the U.S. Military, site security (locked fence, restricted access, monitoring cameras, 24-hour security guards) is strictly enforced. It is, therefore, highly unlikely that non-employees could contact hazardous substances stored indoors on site. The facility's delisting as a TSD facility has scaled down the quantity, use and leave of hazardous materials on site, thereby reducing the risks to company employees.

There were no incidents of accident or injury on record at the respective state and local government agencies used as sources of information for this report.

FIRE AND EXPLOSION

As part of the facility's fire prevention program a 300,000-gallon water tank is maintained on site and flammable materials and gases are stored indoors in a concrete-curbed, explosion-proof building.

There were no reported incidents of fire or explosion on record at the respective state and local government agencies.

ADDITIONAL CONSIDERATIONS

There was no observed damage to flora or fauna or off-site property noted during a Pre-Sampling Assessment conducted on October 4, 1991 by the NJDEPE, Division of Responsible Party Site Remediation, Bureau of Site Assessment.

ENFORCEMENT ACTIONS

A Notice of Violation was issued by the NJDEP, Division of Waste Management, Bureau of Field Operations, on September 9, 1985 for the removal of hazardous waste storage tanks prior to approval of the closure plan. A penalty of $1,500 was assessed for the violation.

A Notice of Violation was issued on October 21, 1985 by the NJDEP, Division of Hazardous Waste Management, Bureau of Field Operations for non-notification of a spill of PCB contaminated oil. The spill was caused during a routine service stop by General Electric and was contained and cleaned up by Bendix.

An Administrative Consent Order was issued on July 28, 1986 by the NJDEP, Division of Waste Management which required Allied-Signal to complete all applicable ECRA program requirements, including exercise of the financial assurance pursuant to ECRA.

SUMMARY OF SAMPLING DATA

1. Sampling dates: April 1990

Sampled by: Ebasco Environmental
Lyndhurst, New Jersey

Samples: 21 groundwater samples

Laboratory: Analytikem
28 Springdale Road
Cherry Hill, New Jersey
Laboratory Certification No. 04012

Parameters: Volatile organic compounds (VOCs), base/neutral compounds (BNs), priority pollutant metals (PP metals)

Sample description: 21 on-site monitoring wells

Contaminants detected:

Well #	Contaminant	Concentration (ppb)
CS-15	vinyl chloride	20,000
	2-methylphenol	6.9
	4-methylphenol	29
	2,4-dimethylphenol	3
CS-18	chloroethane	290
	n-nitrosodiphenylamine	19
	methylene chloride	68
	1,1-dichloroethene	1,500
	trans-1,2-dichloroethane	170,000
	1,1,1-trichloroethane	10,000
	trichloroethene	12,000
	1,1,2-trichloroethane	90
	benzene	240
	toluene	5,500
	ethylbenzene	780
	m-xylene	1,800
	o,p-xylene	1,600
	chloroform	110
	1,1,2-trichloro-1,2-trifluoroethene	2,900
	acetone	170
	1,2-dichloro-1,1,2-trifluoroethane	1,100
	phenol	120
	dimethyl benzene isomer	690
OS-1	phenol	120
	dimethyl benzene isomer	690
	trimethylbenzene isomer	860
	ethylmethyl benzene isomer	290
	ethylbenzene isomer	1,600
	methylbenzene	2,000
	arsenic	13

Well #	Contaminant	Concentration (ppb)
	chromium	52
	silver	20
	zinc	34
	methylene chloride	68
CS-16	1,1-dichloroethane	170,000
	1,2-dichloroethane	21
CS-7	benzidine	6.9

QA/QC: QA/QC requirements were within guidelines established by the NJDEP.

File location: Attachments F143 to F146
NJDEPE, Industrial Site Evaluation Element (ISEE), Bureau of ECRA Applicability and Compliance (BEAC)
401 East State Street
Trenton, New Jersey

2. Sampling dates: April 1990

Sampled by: Ebasco Environmental
Lyndhurst, New Jersey

Samples: 9 sediment samples

Laboratory: Analytikem
28 Springdale Road
Cherry Hill, New Jersey
Laboratory Certification No.04012

Parameters: VOCs, BNCs, PP metals, total petroleum hydrocarbons (TPHs) and cyanide

Sample description: One Sample in Area 12 - Equalization Pit
Three Samples in Area 13 - Eastern Ditch
Five Samples in Area 11 - Western Drainage Ditch

Contaminants detected:

Sample #	Contaminant	Concentration (ppb)
EQ-01	naphthalene	12
	acenaphthene	10
	phenanthrene	120
	anthracene	23
	fluoranthene	170
	pyrene	160
	benzo(a)anthracene	71
	chrysene	100
	benzo(b)fluoranthene	53
	benzo(k)fluoranthene	64
	benzo(a)pyrene	59

Sample #	Contaminant	Concentration (ppb)
WD-02	chromium	2,700
	copper	2,300
	zinc	1,700
WD-01	lead	1,100
	mercury	1.2
	Aroclor 1248	320
WD-04	silver	640
	petroleum hydrocarbons	5,300
ED-03	lead	280
	silver	61
	zinc	410
ED-02	petroleum hydrocarbons	2,600

QA/QC: QA/QC requirements were within the guidelines established by the NJDEP.

File location: Attachments F139 to F142
NJDEPE, ISEE, BEAC
401 East State Street
Trenton, New Jersey

3. Sampling dates: March thru April 1990

Sampled by: Ebasco Environmental
Lyndhurst, New Jersey

Samples: 126 soil samples

Laboratory: Analytikem
28 Springdale Road
Cherry Hill, New Jersey
Laboratory Certification No. 04012

Parameters: VOCs, BN, petroleum hydrocarbons

Sample description: Thirteen areas of concern specified in the ECRA Cleanup Plan.

Sample #	Contaminant	Concentration (ppb)
CS-03S-01	m-xylene	29
	petroleum hydrocarbons	3,900
CS-025-01	o,p-xylene	25
	petroleum hydrocarbons	740
CS-015-01	petroleum hydrocarbons	870
	cadmium	8.9
CS-04S-01	petroleum hydrocarbons	270
CS-08S-01	petroleum hydrocarbons	3,400
CS-09S-01	petroleum hydrocarbons	510
	cadmium	37
CS-10S-01	petroleum hydrocarbons	4,400
	cadmium	9.4
	copper	180
CS-11S-01	petroleum hydrocarbons	130

Sample #	Contaminant	Concentration (ppb)
WT-04S-01	trichloroethene	61.0
	tetrachloroethene	19.0
WT-02S-01	petroleum hydrocarbons	130
WT-04S-02	petroleum hydrocarbons	4,900
OS-04S-01	petroleum hydrocarbons	580
OS-04S-01D	petroleum hydrocarbons	1,300
CP-02S-01	copper	1,400
	lead	1,000
	nickel	310
CP-02S-01	zinc	7,400

QA/QC: QA/QC requirements were within the guidelines established by the NJDEP

File location: Attachments F115 to F137
NJDEPE, ISEE, BEAC
401 East State Street
Trenton, New Jersey

RECOMMENDATIONS

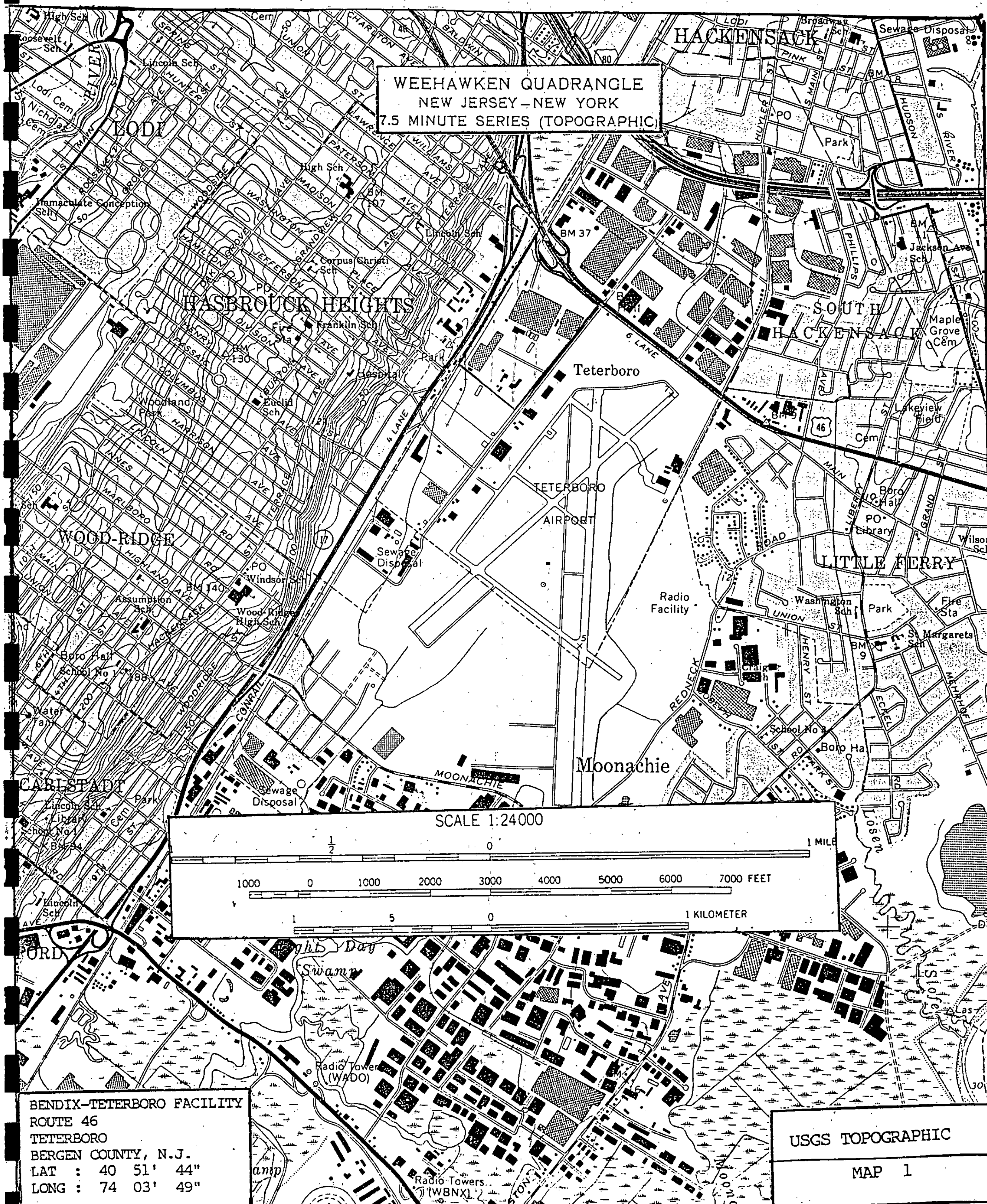
The facility is currently conducting an extensive ECRA investigation involving the sampling of soil, groundwater and sediment. Sampling results indicate contamination in all media in varying concentrations. As part of the ECRA cleanup plan, remediation of the affected areas of concern utilizing the best available technology has been proposed. It is therefore recommended that no sampling by the Bureau of Site Assessment be conducted and no further action under CERCLA is warranted. The state case lead is the Industrial Site Evaluation Element.

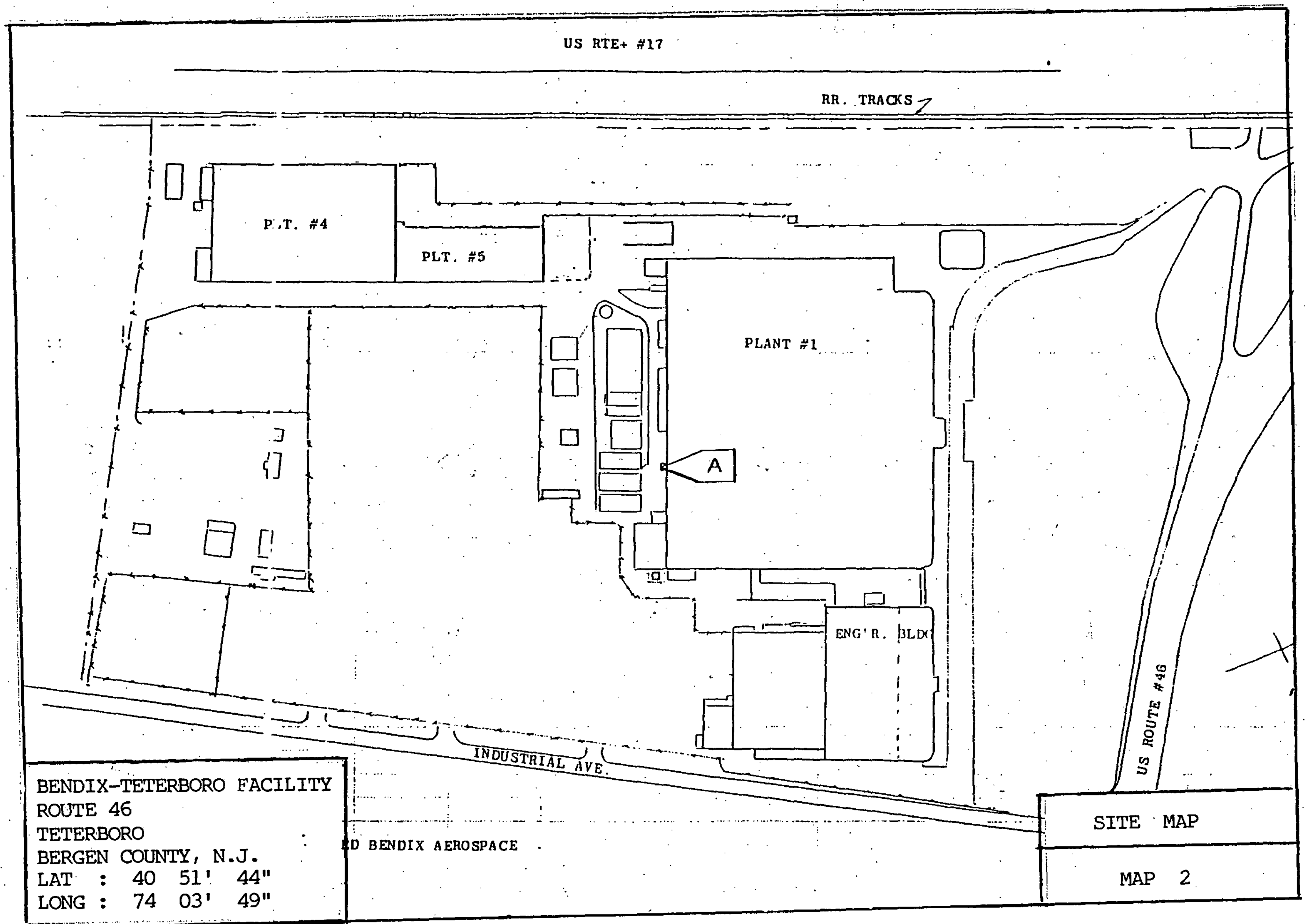
Submitted by:

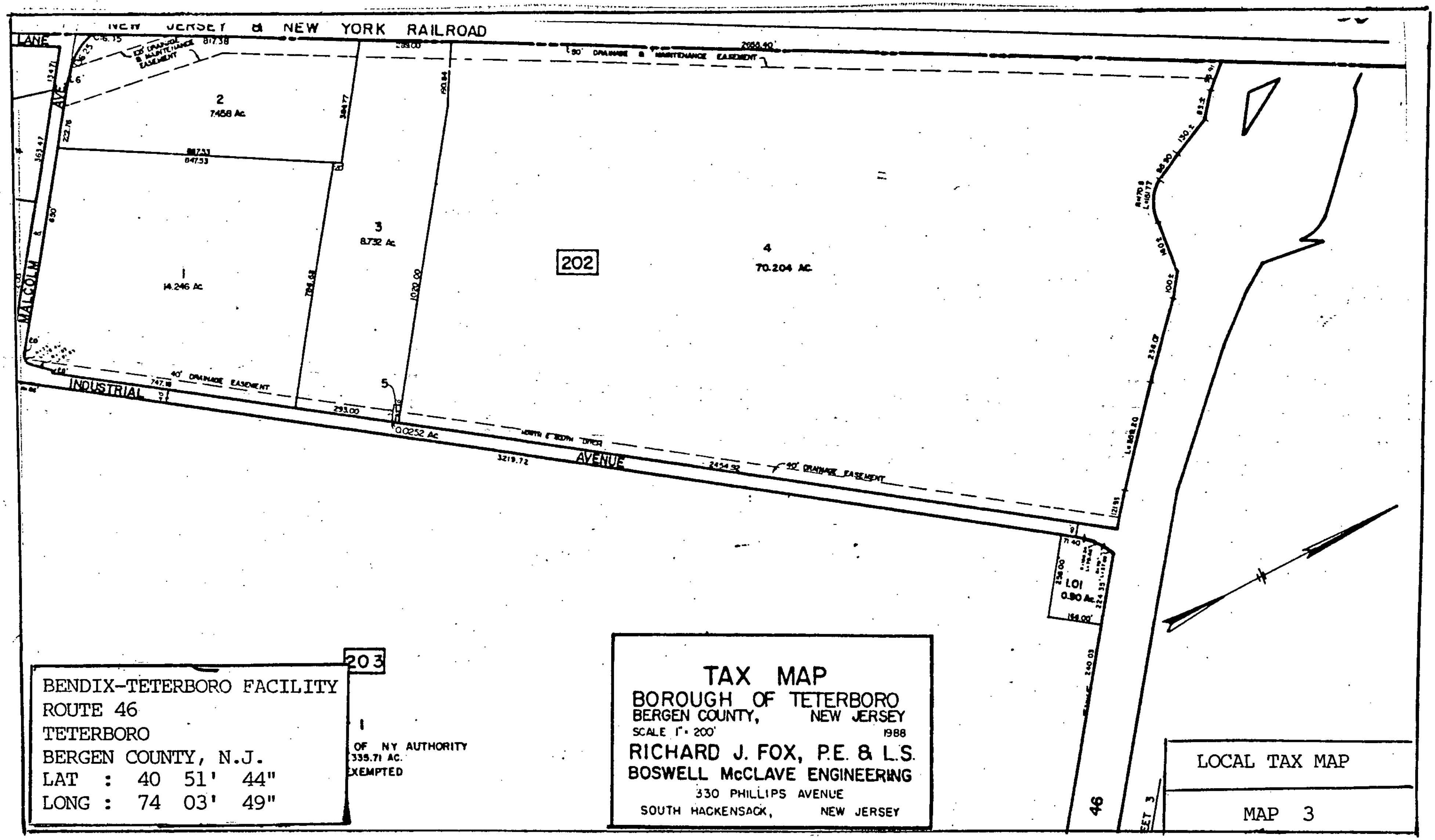
David E. Triggs

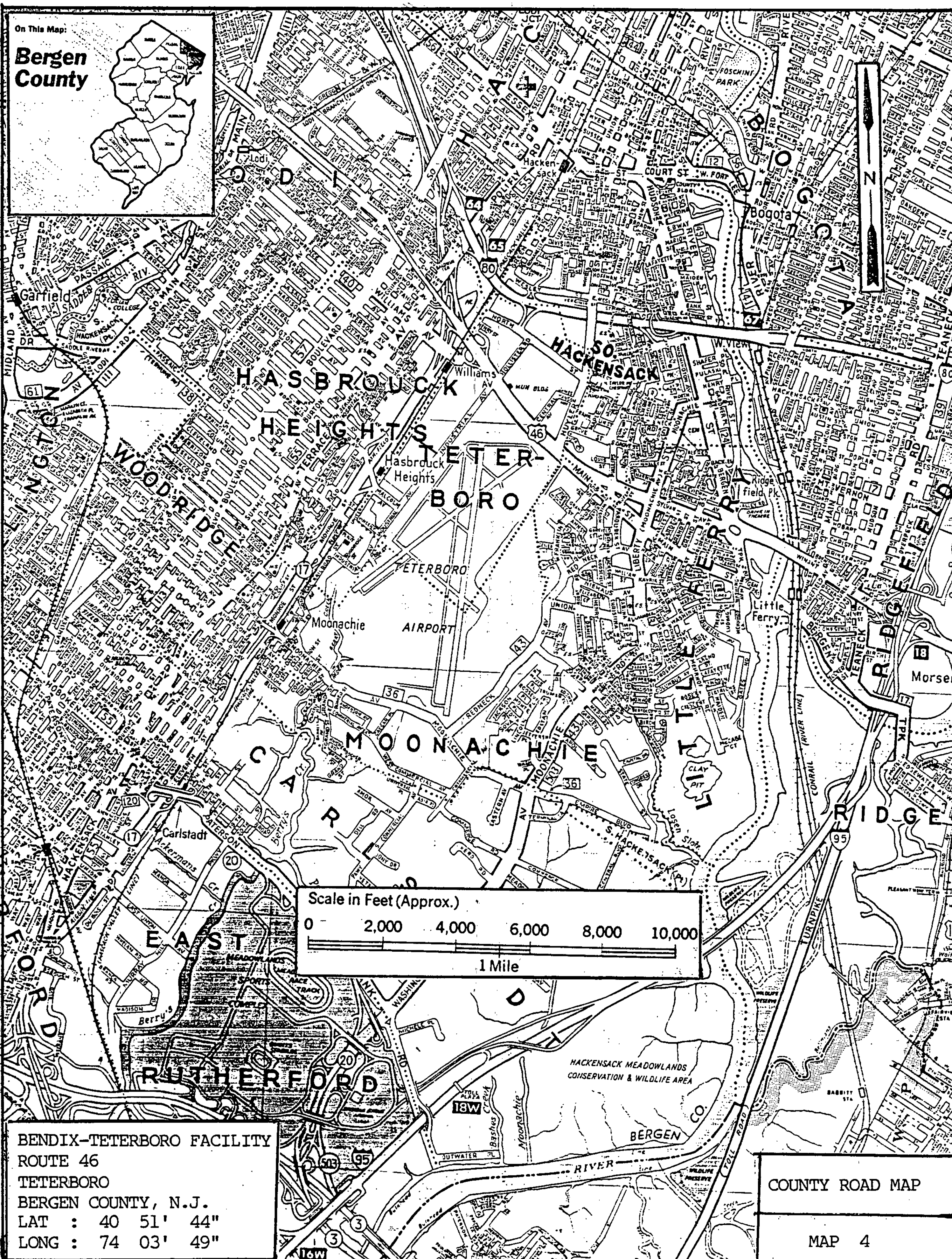
David E. Triggs
HSMS III
Bureau of Site Assessment
December 9, 1991

MAPS


WEEHAWKEN QUADRANGLE
NEW JERSEY – NEW YORK
7.5 MINUTE SERIES (TOPOGRAPHIC)
SCALE 1:24000
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
LODI
HASBROUCK HEIGHTS
WOOD-RIDGE
CARLSTADT
HACKENSACK
SOUTH HACKENSACK
LITTLE FERRY
Teterboro
TETERBORO AIRPORT
Moonachie
Radio Facility
BENDIX-TETERBORO FACILITY
ROUTE 46
TETERBORO
BERGEN COUNTY, N.J.
LAT : 40 51' 44"
LONG : 74 03' 49"
USGS TOPOGRAPHIC
MAP 1


US RTE+ #17
RR. TRACKS
P.T. #4
PLT. #5
PLANT #1
A
ENG'R. BLD
INDUSTRIAL AVE.
US ROUTE #46
D BENDIX AEROSPACE
BENDIX-TETERBORO FACILITY
ROUTE 46
TETERBORO
BERGEN COUNTY, N.J.
LAT : 40 51' 44"
LONG : 74 03' 49"
SITE MAP
MAP 2

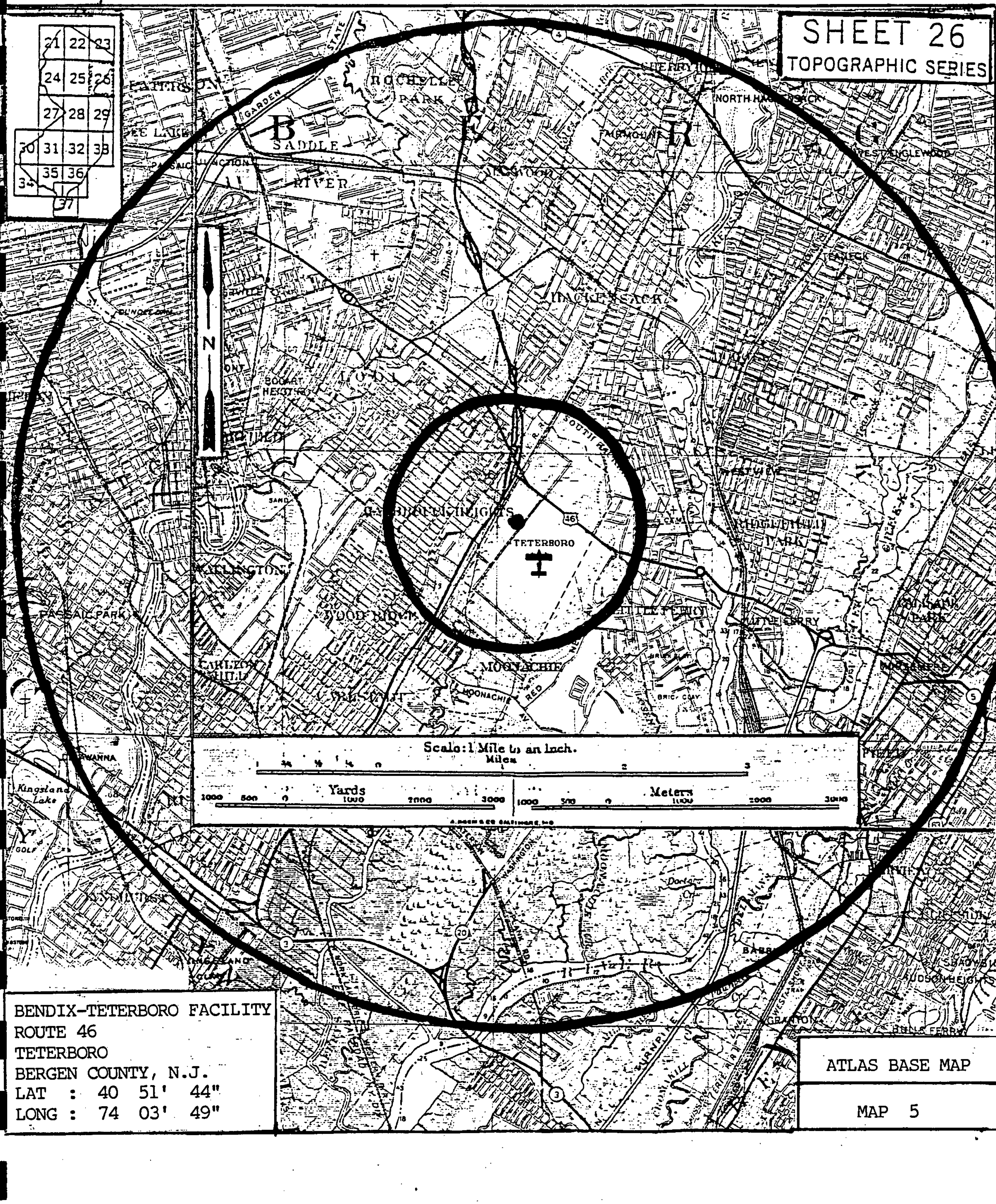

NEW JERSEY & NEW YORK RAILROAD
LANE
MALCOLM AVE.
INDUSTRIAL AVENUE
202
2
7.458 Ac.
1
14.246 Ac.
3
8.732 Ac.
4
70.204 AC.
5
0.0252 Ac.
40' DRAINAGE EASEMENT
80' DRAINAGE & MAINTENANCE EASEMENT
L01
0.90 Ac.
46
203
1
OF NY AUTHORITY
335.71 AC.
EXEMPTED
BENDIX-TETERBORO FACILITY
ROUTE 46
TETERBORO
BERGEN COUNTY, N.J.
LAT : 40 51' 44"
LONG : 74 03' 49"
TAX MAP
BOROUGH OF TETERBORO
BERGEN COUNTY, NEW JERSEY
SCALE 1" = 200' 1988
RICHARD J. FOX, P.E. & L.S.
BOSWELL McCLAVE ENGINEERING
330 PHILLIPS AVENUE
SOUTH HACKENSACK, NEW JERSEY
LOCAL TAX MAP
MAP 3



BENDIX-TETERBORO FACILITY
ROUTE 46
TETERBORO
BERGEN COUNTY, N.J.
LAT : 40 51' 44"
LONG : 74 03' 49"

COUNTY ROAD MAP

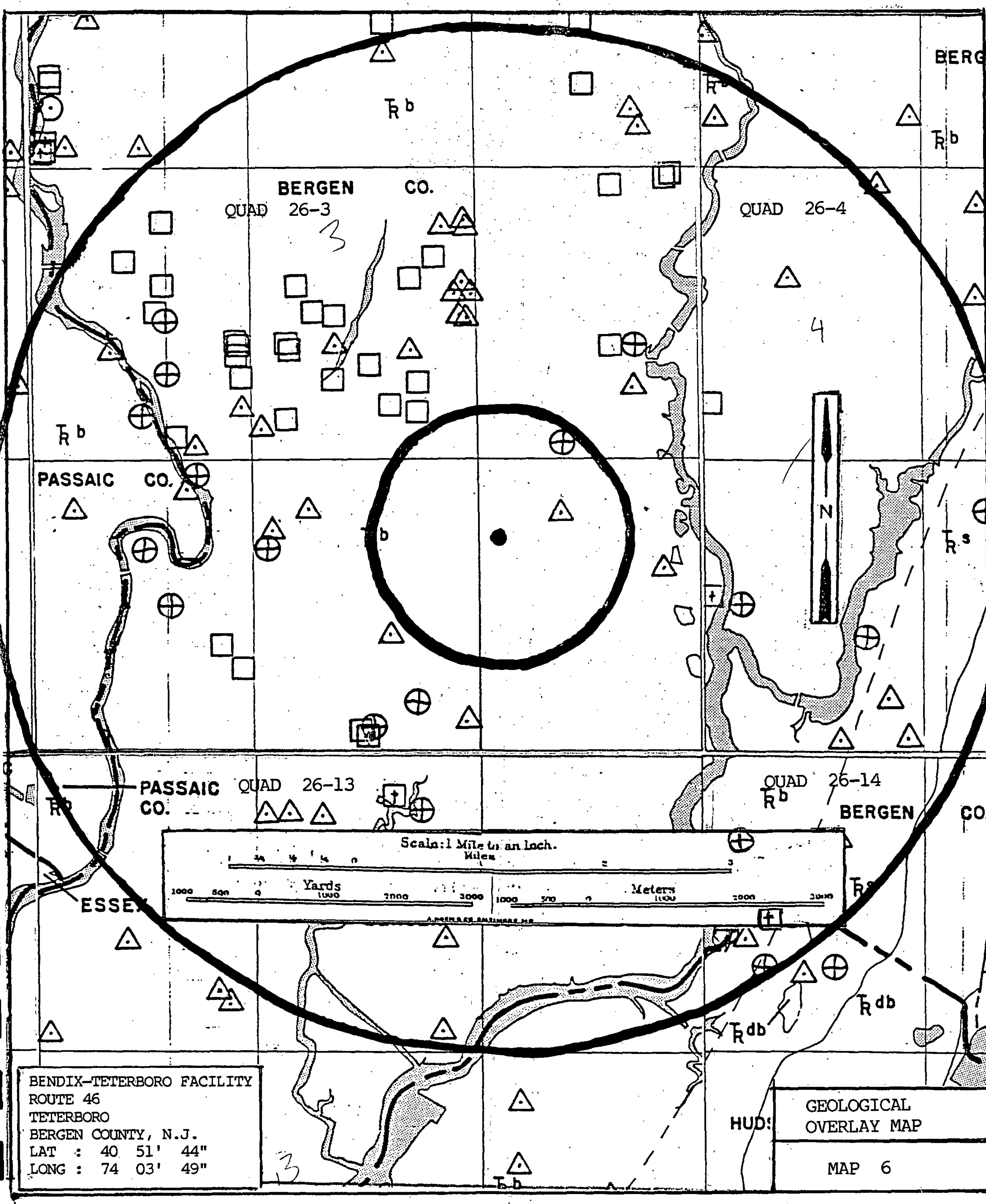
MAP 4



BENDIX-TETERBORO FACILITY
ROUTE 46
TETERBORO
BERGEN COUNTY, N.J.
LAT : 40 51' 44"
LONG : 74 03' 49"

ATLAS BASE MAP

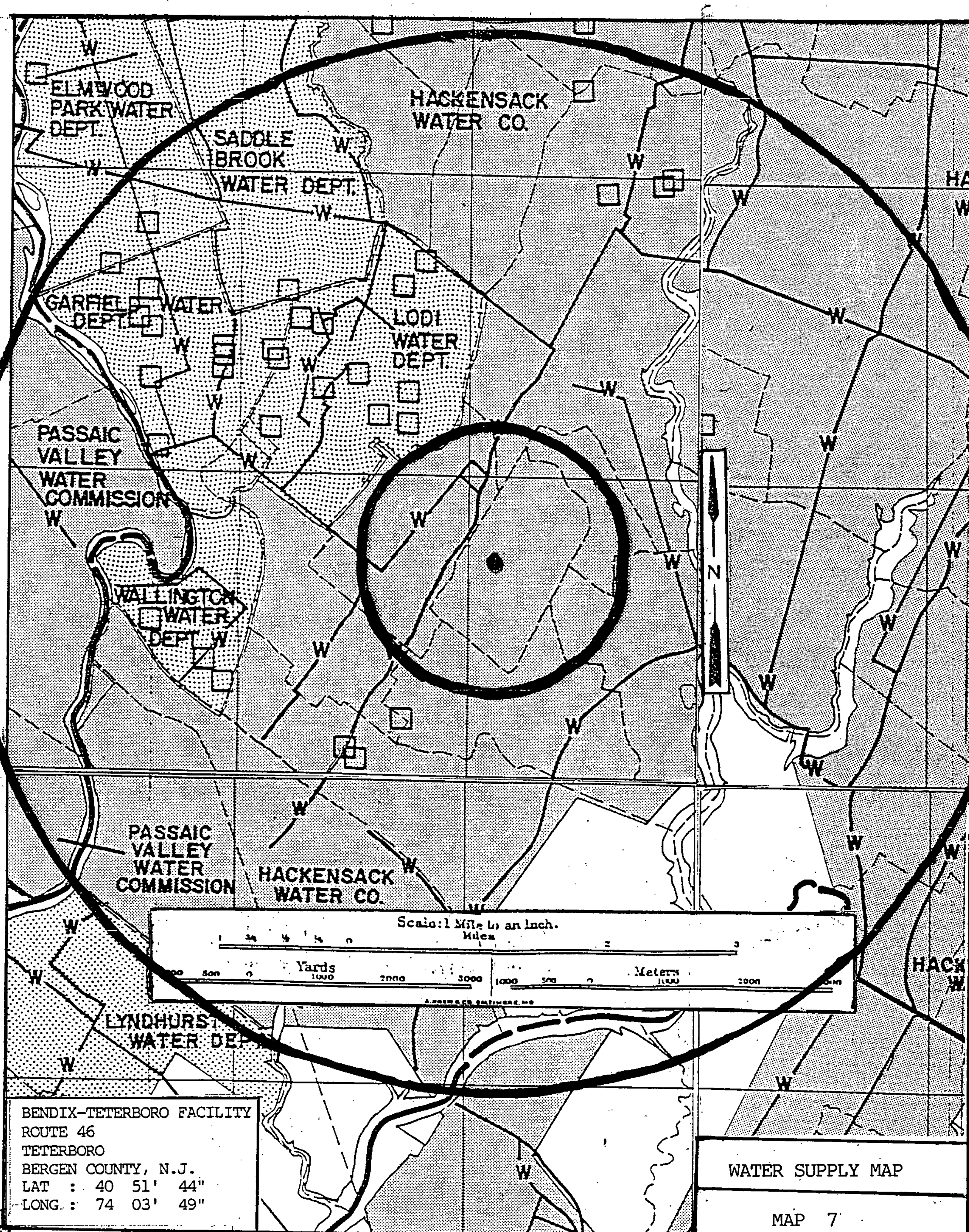
MAP 5



BENDIX-TETERBORO FACILITY
ROUTE 46
TETERBORO
BERGEN COUNTY, N.J.
LAT : 40 51' 44"
LONG : 74 03' 49"

GEOLOGICAL
OVERLAY MAP

MAP 6


ELMWOOD PARK WATER DEPT.
HACKENSACK WATER CO.
SADDLE BROOK WATER DEPT.
GARFIELD WATER DEPT.
LODI WATER DEPT.
PASSAIC VALLEY WATER COMMISSION
WALLINGTON WATER DEPT.
N
PASSAIC VALLEY WATER COMMISSION
HACKENSACK WATER CO.
Scale: 1 Mile to an Inch.
Miles
Yards
Meters
LYNDHURST WATER DEPT.
BENDIX-TETERBORO FACILITY
ROUTE 46
TETERBORO
BERGEN COUNTY, N.J.
LAT : 40 51' 44"
LONG : 74 03' 49"
WATER SUPPLY MAP
MAP 7

LEGEND

WATER SUPPLY		AREA SERVED BY PRIVATE WATER SERVICE COMPANIES
		AREA SERVED BY REGIONALLY OWNED WATER SERVICE COMPANIES
		AREA SERVED BY MUNICIPALLY OWNED WATER SERVICE COMPANIES
		AREA NOT PRESENTLY SERVED BY WATER SERVICE
		PUBLIC SUPPLY WELLS
		WATER MAIN ACROSS HIGHWAY FOR FUTURE USE
		SURFACE WATER INTAKE
	W	MAJOR WATER MAINS
SEWAGE, LANDFILL		AREA SERVED BY PUBLIC SEWAGE SERVICE
		AREA NOT PRESENTLY SERVED BY SEWAGE SERVICE
		SANITARY LANDFILLS
		SEWAGE TREATMENT PLANTS (CAPACITY <0.3mgd)
		SEWAGE TREATMENT PLANTS (CAPACITY ≥ 0.3mgd)
	S	MAJOR SEWAGE TRANSMISSION LINES
DRAINAGE BASIN		DRAINAGE BASIN BOUNDARY
		RIVER BASIN BOUNDARY
	HUDSON	DRAINAGE BASIN NAME
		STREAMS AND RIVERS
		FLOOD PRONE AREAS
POPULATION		COUNTY BOUNDARY
		MUNICIPAL BOUNDARY
	( )	POPULATION DENSITY IN PERSONS PER SQUARE MILE
	[ ]	AREA IN SQUARE MILES
	%	PERCENT AREA OF MUNICIPALITY ON BLOCK
		MARKET ROADS
		BUILT UP AREAS
		STATE BOUNDARY

LEGEND FOR ATLAS SHEET 26 (GEOLOGY)

△ — INDUSTRIAL WELL YIELD OVER 70 GALLONS PER MINUTE (INCLUDING PRIVATE WELLS)

□ — PUBLIC SUPPLY WELL YIELDING OVER 70 GALLONS PER MINUTE

⊕ — UNSUCCESSFUL ROCX WELL YIELDING LESS THAN 70 GALLONS PER MINUTE

⊙ — UNSUCCESSFUL SAND WELL YIELDING LESS THAN 70 GALLONS PER MINUTE

⊞ — NO TEST — NO DATA ON YIELD

FAULT (DASHED WHERE INFERRED)

CONTACT (DASHEO WHERE INFERRED)

PHYSIOGRAPHIC PROVINCE BOUNDARY

WATER SUPPLY TRANSMISSION LINE

NOTE: WHERE THE PRECAMBRIAN FORMATION BOUNDARIES TERMINATE ABRUPTLY, IT IS THE GEOLOGIST'S OPINION THAT THE GEOLOGICAL COMPLEXITY OF THE AREA PREVENTS FURTHER INTERPRETATIONS.

Kmr — CRETACEOUS MAGOTHY AND RARITAN FORMATIONS (SAND ANO CLAY)

TRh — TRIASSIC BRUNSWICX FORMATION

TRc — TRIASSIC CONGLOMERATE BEDS OF THE STOCKTON FORMATION

TRl — TRIASSIC LOCKATGHS FORMATION

TRdb — TRIASSIC DIABASE

TRbs — TRIASSIC BASALT FLOWS

Sd — SILURIAN OECKER LIHESTONE AND LONGWOOO SHALE FORMATIONS

Sgp — SILURIAN GREEN POND CONGLOMERATE

Omb — ORDOVICIAN MARTINSBURG SHALE

€Ok — CAMBRO OROOVICIAN KITTATINNY LIMESTONE

€h — CAMBRIAN HARDYSTON SANDSTONE

PRECAMBRIAN:

gh - HORNBLENDE GRANITE WITH PYROXENE GRANITE

ga - ALASKITE

am - AMPHIBOLITE

px - PYROXENE GNEISS

gnq - OUARTZ PLAGIOCLASE GNEISS

gnb - BIOTITE GNEISS

sk - SKARN, GRAPHITE SCHIST

fnd — FORMATION NOT DETERMINEO

BLOCK #26-03 8/76

A. Hackensack, Orange, Paterson, Weehawken

B. Hackensack-Hackensack; Passaic-Saddle River, Lower Passaic

C. 2.

Map No.	Location	Period of Record
53	Passaic River at Dundee Dam, Clifton	7/23/45
61	Saddle River at Lodi	1923-
62	Weasel Brook at Clifton	1937-1961
419	Fleischer Brook, East Paterson (Market St.)	1967-
423	Sprout Brook at Rbchelle Park	1965-

3.

242	Overpeck Creek at Ridgefield	1964-
248	Passaic River at Garfield	1964
264	Saddle River at Garfield	1967-

Water Quality Standards: (explained in Atlas Sheet description)
FW3, TW1 except where classified TW2 or TW3

D. Brunswick Formation

E. 1. Physiographic Province: Piedmont
Subdivision: Triassic Lowlands
Major Topographic Features: Red Sandstone Plain
Elevations (ft.above sea level): ridges 150, valleys 0
Relief (ft.): 150

2. a. Normal Year: 45"
Dry Year: 36"
Wet Year: 50"

b. January: 31°F
July: 74°F

c. 245 days. Last killing frost: 4/20; first killing frost: 10/20

F. Bergen County:
Saddle River County Park

H. Von Steuben House, River Edge

I. Water Well Records

Location	Owner	Year Drilled	Screen Setting or Depth of Casing	Total Depth	g/m Yield	Formation
26-03-111	Boro of Fair Lawn			408	380	Trb
26-03-111	"			458	280	"
26-03-112	"			500	143	"
26-03-117	Fair Lawn Dairy Co.,Inc.	1955	62	205	125	"
26-03-124	Fair Lawn Water Dept.	1954	47	200	173	"
26-03-127	Fair Lawn Dept.of Pub.Wks.	1955	48/53	400	165	"
26-03-127	Boro of Fair Lawn			338	245	"
26-03-137	Metro Glass			200	120	"
26-03-146	Ellwood Stores Inc.	1952	22	692	100	"
26-03-161	Boro of Wallington			300	304	"
26-03-171	Garfield Boro Water Dept.			330	95	"
△ 26-03-174	Marcal Paper Mills, Inc.	1962	25	35	35	Q
26-03-177	"	1962	23	27	No test	"
26-02-177	"	1962	8	20	"	"
26-03-177	"	1962	22	30	"	"
26-03-178	Sausville, J. & Son			300	100	Trb
26-03-188	Rel Plastic Corp.	1952	79	150	75	"
26-03-211	Boro of Fair Lawn			500	65	"
26-03-217	Farmland Dairies, Inc.	1974	47	635	235	"
26-03-231	All Purpose Roll Leaf	1962	71	350	100	"
26-03-256	Hackensack Water Co.	1965	77'10"	473	250	"
△ 26-03-259	Bijur Lubricating Corp.			175	200	"
26-03-262	Alexander's Dept. Store	1961	25	35	290	Q
26-03-355	Hackensack Water Co.	1959		75	No test	Trb
□ 26-03-382	Lodi Dept.of Public Works			450	175	"
△ 26-03-394	Spartan Typographers Inc.	1956	135	145	75	Q
△ 26-03-394	Hackensack Cable Co.	1958	106	120	171	Trb
□ 26-03-426	East Paterson, Boro of	1954	80	200	180	"
□ 26-03-427	Boro of Wallington			400	350	"
□ 26-03-453	City of Garfield	1966	57/77	475	77	"
□ 26-03-456	"	1967	33/56	400	328	"
⊕ 26-03-456	"	1966	20/43	710	30	"
△ 26-03-457	Whippany Paper Board	1956	54	250	312	"
□ 26-03-469	City of Garfield			273	95	"
□ 26-03-469	"			320	130	"
□ 26-03-469	"			165	400	"
⊕ 26-03-483	"	1966	21/40	400	25	"
⊕ 26-03-485	Botany Worsted Mills			81	7	"
26-03-489	City of Garfield	1967	61.5	276	No test	"
□ 26-03-493	"			326	89	"
△ 26-03-496	Laurel Co.			500	100	"
△ 26-03-497	Heyden Chemical Works			375	90	"
△ 26-03-535	Aquarium, Inc.	1963	22	300	172	"
△ 26-03-536	Maywood Chemical Co.			220	400	"
△ 26-03-536	Citro Chemical Co.			220	400	"
□ 26-03-538	Lodi, Boro of			403	600	"
□ 26-03-542	City of Garfield	1968	15/35	405	405	"
□ 26-03-546	Lodi, Boro of			300	170	"
□ 26-03-548	"			?	135	"
□ 26-03-548	"			200	125	"
□ 26-03-554	Lodi Dept.of Public Works	1965	20/40	510	100	"

△	26-03-557	Washine Chemical Co.	1966	29'4"/ 46'10-1/2"	400	100	Trb
□	26-03-561	Boro of Lodl			?	295	"
△	26-03-563	Lodi Shopping Center	1960	22	300	290	"
△	26-03-563	"	1956	20'8"	301	350	"
△	26-03-563	Muscarelle, J.L., Inc.	1966	32	400	159	"
△	26-03-566	Interchemical Corp.			435	187	"
△	26-03-566	Spiegal Mfg. Corp.	1969	34/43	300	237	"
△	26-03-567	Master Etching Corp.	1965	29	400	105	"
□	26-03-575	Boro of Lodi	1954	31'5"/ 53'1"	459	157	"
△	26-03-577	Yoo-Hoo Beverage Co.	1959	22	303	95	"
□	26-03-581	Boro of Lodi			?	145	"
□	26-03-582	Lodi Dept.of Public Works	1965	36/56	450	175	"
□	26-03-586	Boro of Lodi			?	109	"
□	26-03-591	"	1966	28/48	470	285	"
□	26-03-594	"			350	85	"
□	26-03-623	Hackensack Water Co.			189	215	Q
□	26-03-632	"	1954	130/ 148'8"	168	1700	"
□	26-03-632	"	1955	168	190	1420	"
□	26-03-659	Bowler City	1958	120	400	108	Trb
⊕	26-03-667	Food Fair Stores	1954	270	525	55	"
⊕	26-03-687	Spinnerin Yarn	1965	110	400	55	"
△	26-03-691	Seilheimer Beverage Co.	1958	115	415	76	"
△	26-03-715	Farmland Dairy Inc.	1968	12/50	400	25	"
⊕	26-03-728	Paterson Parchment Paper Co.			378	53	"
⊕	26-03-731	Prescott, J.L. & Co.	1962	90	500	25	"
△	26-03-731	Tendebrands Frozen Foods	1950	76	230	100	"
⊕	26-03-756	Boro of Wallington	1964	118.5	300	30	"
□	26-03-768	"	1965	40	400	217	"
□	26-03-793	"			300	330	"
	26-03-816	Wright Aeronautical Eqpt.	1957		340	515	"
△	26-03-817	Tube Reducing Corp.	1954	20	397	90	"
⊕	26-03-817	"	1954	31	392	20	"
△	26-03-859	Terminal Construction Co.	1952	20	145	120	"
⊕	26-03-888	Hackensack Water Co.	1955	86	86	300	Q
□	26-03-888	"	1955		263	No test	Q
□	26-03-888	Lancaster Chemical Co.	1963	311/287	400	55	Trb
⊕	26-03-894	Hackensack Water Co.	1955		243	60	Q
△	26-03-899	World Plastic Extruders,Inc.	1966	53	200	100	Trb
△	26-03-924	DeTroy Press, Inc.	1956	67	150	95	"
△	26-03-962	Stage Coach Inn			565	110	"

J. Geodetic Coatrol Survey monuments described
Index Maps 15,21; adjacent Index Map 16

BLOCK #26-04,05

A. Central Park, Hackensack, Weehawken, Yonkers

B. Hackensack-Hackensack, Hudson-Hudson

C.	Map No.	Location	Period of Record
2.	414	Metzler Brook at Englewood	1965-
3.	239	Hackensack River at Hackensack	1964-
	240	Hackensack River at Little Ferry	1964-
	241	Overpeck Creek at Ridgefield	1964-
	242	Berrys Creek at Moonachie	1964-

Water Quality Standards: (explained in Atlas Sheet description)
FW2, TW1 except where classified FW3 or TW2

D. Brunswick Formation (Trb), Stockton Formation (Trs), Diabase (Trdb)

E. 1. Physiographic Province: Piedmont
Subdivision: Triassic Lowlands
Major Topographic Features: Red Sandstone Plain, Palisades Ridge
Elevations (ft.above sea level): ridges 450,valleys 0
Relief (ft.): 450

2. a. Normal Year: 44"
Dry Year: 36"
Wet Year: 51"

b. January: 32°F
July: 74°F

c. 246 days. Last killing frost: 4/20; first killing frost: 10/20

F. Bergen County:
Overpeck County Park and Golf Course

G. Palisades Interstate Park Commission - Palisades Interstate Park

H. Palisades Interstate Park

I. Water Well Records

Location	Owner	Year Drilled	Screen Setting or Depth of Casing	Total Depth	g/m Yield	Formation
26-04-144	Silver Park Record Co.	1958	44	335	185	Trb
26-04-174	Federated Dept.Stores Int.	1959	117'11"	147	254	Q
26-04-196	Englewobd Hospital Assn.	1968	53'3"	230	222	Trb
26-04-212	Food Fair Stores	1958	25	300	172	"
26-04-227	Patterson, H & Sons	1966	20	198	225	"
26-04-233	Grand Union Co.			50	82	Trs
26-04-296	Englewood Hospital Assn.			218	89	"
26-04-317	Clinton Inn	1963	39	107	402	"
26-04-432	Grand Union Co.	1953	35	150	75	Trb
26-04-451	Home Town Laundries, Inc.			240	150	"
26-04-474	Bogota Water Co.			275	160	"
26-04-516	Tenafly Enterprises	1970	33	168	70	?
26-04-543	Spiegel Mfg.Corp.	1963	135	145	150	Q
26-04-556	Scharf, Charles	1955	64	250	100	Trs
26-04-557	Cart-Wright, Inc.	1960	115	298	100	"
26-04-744	Flinkote Co.	1955	38	38	No test	Q
26-04-745	Hygenic Ice Co.			750	7	Trb
26-04-767	Schonbrunn Co., Inc.	1965	40	291	60	Trs
26-04-795	J.G.Knits, Inc.	1972	50	300	250	Trb
26-04-789	Grove Pine Corp.	1966	88-	315	200+	Trs
26-04-799	Great Bear Spring Co.	1965	30	95	178	Trb
26-04-816	Leonia Board of Education	1968	58	350	52	Trs

J. Geodetic Control Survey monuments described
Index Maps 15,16,21

BLOCK #26-13

8/76

A. Jersey City, Orange, Weehawken

B. Hudson-Hudson; Hackensack-Hackensack; Passaic-Lower Passaic

C. 3. Map No. Location Period of Record

Map No.	Location	Period of Record
242	Berry's Creek at Moonachie, Moonachie Ave.	1964-
263	Hackensack River at Harrison, Belleville Tpk.	1967-

Water Quality Standards: (explained in Atlas Sheet description)
TW2 except where classified TW3

D. Brunswick Formation (Trb), Stockton Formation (Trs), Diabase (Trdb), Manhattan Schist (Oms)

E. 1. Physiographic Province: Piedmont
Subdivision: Triassic Lowlands
Major Topographic Features: Red Sandstone Plain, Palisades Ridge, Hackensack Meadows
Elevations (ft.above sea level): ridges 250, valleys 0
Relief (ft.): 250

2. a. Normal Year: 43"
Dry Year: 36"
Wet Year: 53"

b. January: 32°F
July: 74°F

c. 245 days. Last killing frost: 4/10; first killing frost: 10/20

F. Bergen County:
Riverside County Park and Hackensack River Area

I. Water Well Records

Location	Owner	Year Drilled	Screen Setting or Depth of Casing	Total Depth	g/m Yield	Formation
26-13-157	Pennick, S.B. Co.	1966	42	352	180/200	Trb
26-13-177	Breyer Ice Cream Co.			702	200	"
26-13-195	Omni Chemical Corp.	1968	39	300	157	"
26-13-195	Sika Chemical Corp.	1966	25	302	220	"
△ 26-13-214	Trubeck Laboratories	1956	191	201	105	Q
△ 26-13-215	Beckton & Dickinson	1966	118	363	251	Trb
△ 26-13-216	Marijon Piece Dye Co.	1965	45	285	135	"
26-13-226	Hackensack Water Co.	1954	92'11"	103	No test	Q
△ 26-13-234	U.S. Printing Ink Co.	1965	70	220	60	Trb
△ 26-13-268	Top Notch Plating Co.	1965	21	300	190	"
△ 26-13-298	Alpha Refining Co.			400	115	"
26-13-415	Minit-Man Auto Car Wash	1957	39	180	90	"
26-13-447	Food Fair Stores, Inc.	1956	30	320	82	"
26-13-499	Pfaff Tool & Mfg. Co.	1963	66.5	740	145	"

BLOCK #26-14, 15

A. Central Park, Jersey City, Weehawken

B. Hackensack-Hackensack, Hudson-Hudson

C. 2. Map No. Location Period of Record
415 Wolf Creek at Ridgefield 1965-

Water Quality Standards: (explained in Atlas Sheet description) TW2

D. Brunswick Formation (Trb), Stockton Formation (Trs), Diabase (Trdb), Manhattan Schist (Oms), Serpentine (sp)

E. 1. Physiographic Province: Piedmont
Subdivision: Triassic Lowlands
Major Topographic Features: Red Sandstone Plain, Palisades Ridge, Hackensack Meadows
Elevations (ft.above sea level): ridges 250, valleys 0
Relief (ft.): 250

2. a. Normal Year: 47"
Dry Year: 39"
Wet Year: 55"

b. January: 32°F
July: 74°F

c. 242 days. Last killing frost: 4/20; first killing frost: 10/20

I. Water Well Records

Location	Owner	Year Drilled	Screen Setting or Depth of Casing	Total Depth	g/m Yield	Formation
⊕ 26-14-118	Colorite Color Plastics	1968	52/62	425	20	Trb
26-14-129	Merrill Corp.			300	90	Trs
⊞ 26-14-146	Gibraltar Corrugated Paper Co.	1952	136	170	No test	Trb
26-14-147	Armour Soap Works			116	0	Q
△ 26-14-148	"			108	265	"
⊕ 26-14-173	"			330	14	Trs
26-14-182	Gibraltar Corrugated Paper Co.	1954	105	122	300	Q
26-14-183	Consolidated Bleaching	1950	93	528	44	Trdb
26-14-742	Sweets Co. of America	1955	47'1"	400	105	Trs
26-14-744	Chocolat Menier			500	125	"
26-14-771	Progressive Silk Finishing Co.			500	125	"

J. Geodetic Control Survey monuments described
Index Maps 21,16,26

SU[redacted]CT[redacted] RE[redacted]ION

WATER WITHDRAWAL POINTS AND NJGS CASE INDEX SITES WITHIN 5.0 MILES OF:

LATITUDE 405144
LONGITUDE 740349

DRAFT

SCALE: 1:63,360
(1 Inch = 1 Mile)

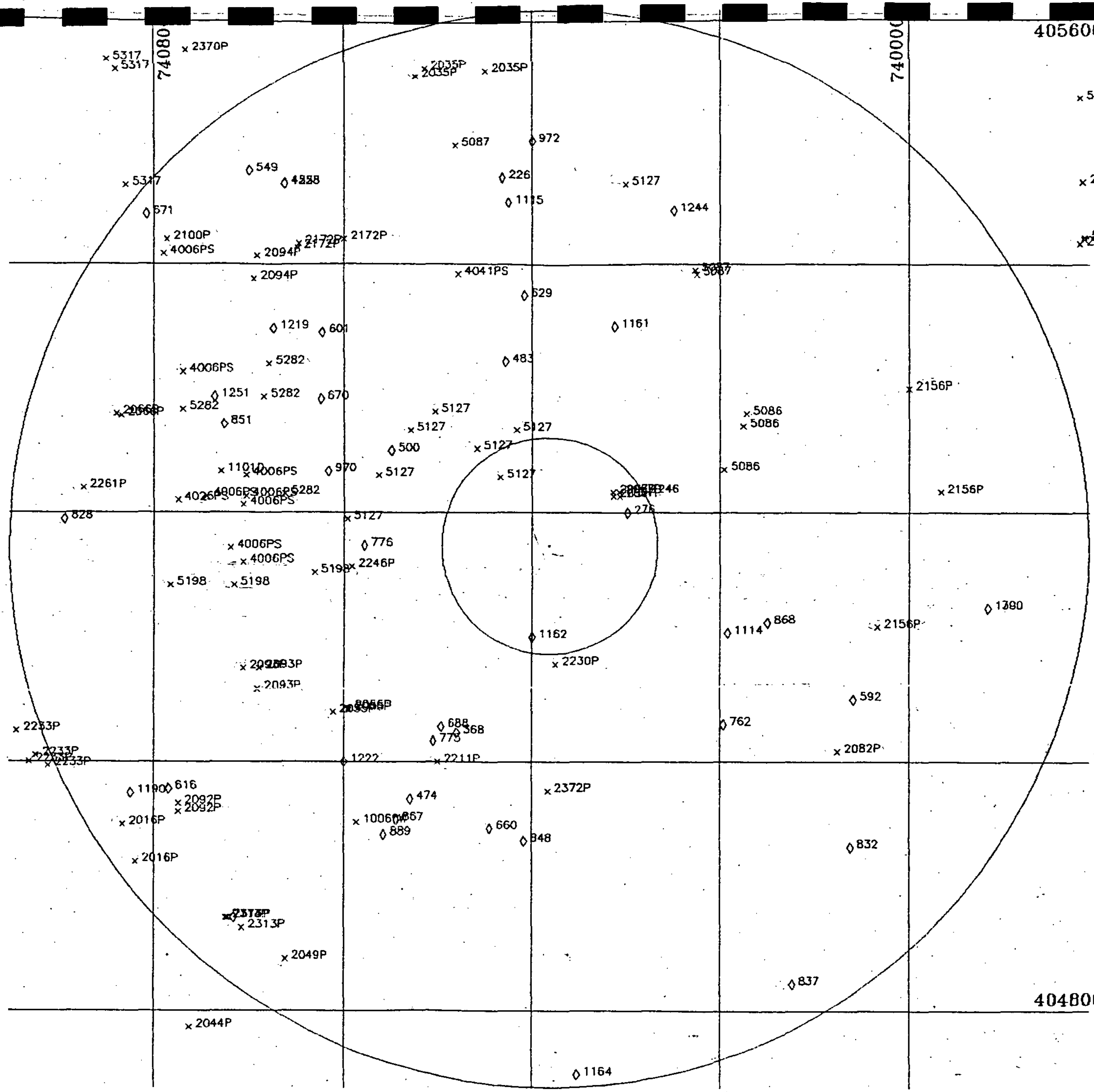
× WATER WITHDRAWAL POINTS
◊ NJGS CASE INDEX SITES
1 MILE AND 5 MILE RADII INDICATED

NJGS CASE INDEX DATA RETRIEVED FROM:
NEW JERSEY GEOLOGICAL SURVEY
ON 12/22/87

MAP 8

PLOT PRODUCED BY:
NJDER
DIVISION OF WATER RESOURCES
BUREAU OF WATER ALLOCATION
CN-029
TRENTON, NJ 08625

DATE: 10/06/89



SUBJECT TO REVISION

SITENUM	NAME	LAT	LON	DISTANCE	CONTAM	FMCODE1	FMCODE2	STATUS1	STATUS2
928	POUGHKEEPSIE FINISHING CORP (2ND CASE?), CLIFTON	405157	740857	4.5	00	0103	3070	1	B
1190	ITT AVIONICS, 100 KINGSLAND RD., CLIFTON, PASSAIC CO.	404945	740815	4.5	04			3	
671	MORTON THIOKOL INC., PATERSON, PASSAIC CO.	405424	740805	4.8	13	130	3070	2	H
616	GIVAUDAN CORP, CLIFTON, PASSAIC CO.	404947	740751	4.2	00	130	3070	1	E
1251	GARFIELD WATER DEPARTMENT, GARFIELD, BERGEN CO.	405256	740722	3.4	01	0120	3070	1	
851	WHIPPANY PAPER BOARD CO. INC	405243	740716	3.2	00	0103	3070	1	B
174	FENICK CORP., LYNDHURST, BERGEN CO.	404845	740710	4.5	12	0110	3070	2	J
549	GARFIELD MUNICIPAL WELLS, ELMWOOD PARK, BERGEN CO.	405445	740700	4.4	00	130	3070	1	E
1219	EMPIRE OVERALL, ELMWOOD PARK, BERGEN CO.	405329	740645	3.3	00	0110	3070	1	C
452	LAPLACE AND GRANT CHEMICALS, ELMWOOD PARK, BERGEN CO.	405439	740638	4.2	00	130	3070	1	E
1258	STOR DYNAMICS, ELMWOOD PARK, BERGEN CO.	405439	740638	4.2	00	0130	3070	1	E
670	SKETCHLEY SERVICES, BERGEN CO.	405255	740615	2.5	00	0110	3070	1	G
601	CURCIO SCRAP METALS, GARFIELD, BERGEN CO.	405327	740614	2.9	50	130	3070	1	
970	E.C. ELECTROPLATING, GARFIELD, BERGEN CO.	405220	740610	2.2	0	0	0	3	
1222	WALLINGTON WATER DEPT., WALLINGTON, BERGEN CO.	405000	740600	2.8	00	0120	3070	1	C
776	CURTISS-WRIGHT CORP	405144	740547	1.7	00	3070	0	1	A
889	J.B.M.T. PRINTING, E. RUTHERFORD, BERGEN CO.	404925	740535	3.1	00	0101	0100	1	B
500	LODI MUNICIPAL WELL V.O. CONTAM, LODI, BERGEN CO.(SEE ALSO 629)	405230	740530	1.7	0	120	3070	1	E
867	GENERALFOAM CORP, E. RUTHERFORD, BERGEN CO.	404932	740527	2.9	63	0103	0101	1	
474	U O P JOHNSON, EAST RUTHERFORD, BERGEN CO.	404942	740518	2.7	00	103	101	1	E
775	COSAN CHEMICAL CORP, CARLSTADT, BERGEN CO.	405010	740503	2.1	00	0120	3070	1	A
683	DIAMOND SHAMROCK, CARLSTADT, BERGEN CO.	405017	740458	1.9	50	103	101	1	
368	BERRY'S CREEK PROJECT, WOODRIDGE, BERGEN CO.	405014	740448	1.9	38	100	0	1	D
660	SCIENTIFIC CHEMICAL PROCESSING, CARLSTADT, BERGEN CO.	404928	740427	2.7	00	0110	3070	1	C
226	MOBIL, (SHOTMEYER) PARAMUS, BERGEN CO.	405442	740419	3.4	51	130	3070	1	
483	INMONT CHEMICAL, LODI, BERGEN CO.	405313	740417	1.8	00	100	3070	1	B
1115	SHOTMEYER BROS. MOBIL, PARAMUS	405430	740415	3.2	51			1	B
629	LODI/MAYWOOD RADIOLOGICAL CONTAM., BERGEN CO.(SEE ALSO 500)	405345	740405	2.3	67	120	3070	1	E
848	VORAC CO—DIV OF SEAGRAVE COATINS, CARLSTADT, BERGEM CO.	404922	740405	2.7	00	0103	0101	1	B
972	VALVE GAS STATION, PARAMUS, BERGEN CO.	4055	740400	3.8	0	0	0	3	
1162	UNITED WIRE HANGER CORP. HASBROUCK HEIGHTS, BERGEN CO.	405100	740400	0.9	52			3	
1164	PLAZA AMOCO/KECKEY'S EXXON, SECAUAUS, HUDSON CO.	404729	740332	4.9				3	
1161	GTE-SYLVANIA, TETERBORO, BERGEN CO.	405330	740308	2.1	53			3	
276	GREAT BEAR SPRING CO., BERGEN CO.	405200	740300	0.8	53	0103	3070	2	
1246	STONE NYCAL, S. HACKENSACK, BERGEN CO.	405210	740249	1.0	63	0100	3070	1	C
1244	ROY'S AMOCO, HACKENSACK, BERGEN CO.	405426	740230	3.3	51	0110	3070	1	C
762	ANDRILL OIL CORP—LITTLE FERRY TER	405018	740158	2.3	00	0103	0101	1	B
1114	RIDGEFIELD PARK EXXON, RIDGEFIELD PARK, BERGEN CO.	405102	740155	1.8	63	0103	0100	1	G
868	TEXACO AT MAIN & PARK ST., RIDGEFIELD PARK, BERGEN CO.	405107	740130	2.1	51	3070	0	1	B
837	SPONGE CLEAN PRODUCTS CO, INC, N. BERGEN, HUDSON CO.	404813	740114	4.6	00	0101	3070	1	B
832	SAM GAEBAY, INC., FAIRVIEW, BERGEN CO.	404919	740037	3.9	00	0102	0	4	B
592	PFISTER CHEMICAL, RIDGEFIELD, BERGEN CO.	405030	740035	3.2	1	110	3070	1	E
179	LEONIA SPILL, LEONIA, BERGEN CO.	405114	735910	4.1	52	0100	3050	1	B
1300	WESTGATE CONDOMINIUM CORP., FORT LEE, BERGEN CO.	405114	735910	4.1	52	0100	3050	1	B

Number of Observations: 44

SUBJECT TO REVISION

 NJGS CASE INDEX SITES WITHIN 5.0 MILES OF 405144 LAT. 740349 LON. AS OF 12/22/87 (IN ORDER BY SITE NUMBER) - 10/06/87

SITENUM	NAME	LAT	LON	DISTANCE	CONTAM	FMCODE1	FMCODE2	STATUS1	STATUS2
174	FENICK CORP., LYNDHURST. BERGEN CO.	404845	740710	4.5	12	0110	3070	2	J
179	LEONIA SPILL, LEONIA. BERGEN CO.	405114	735910	4.1	52	0100	3050	1	B
226	MOBIL, (SHOTMEYER) PARAMUS, BERGEN CO.	405442	740419	3.4	51	130	3070	1	
276	GREAT BEAR SPRING CO., BERGEN CO.	405200	740300	0.8	53	0103	3070	2	
368	BERRY'S CREEK PROJECT, WOODRIDGE, BERGEN CO.	405014	740448	1.9	38	100	0	1	D
452	LAPLACE AND GRANT CHEMICALS, ELMWOOD PARK. BERGEN CO.	405439	740638	4.2	00	130	3070	1	E
474	U O P JOHNSON, EAST RUTHERFORD, BERGEN CO.	404942	740518	2.7	00	103	101	1	E
483	INMONT CHEMICAL, LODI, BERGEN CO.	405313	740417	1.8	00	100	3070	1	B
500	LODI MUNICIPAL WELL V.O. CONTAM, LODI. BERGEN CO.(SEE ALSO 629)	405230	740530	1.7	0	120	3070	1	E
549	GARFIELD MUNICIPAL WELLS. ELMWOOD PARK. BERGEN CO.	405445	740700	4.4	00	130	3070	1	E
592	PFISTER CHEMICAL, RIDGEFIELD. BERGEN CO:	405030	740035	3.2	1	110	3070	1	E
601	CURCIO SCRAP METALS. GARFIELD. BERGEN CO.	405327	740614	2.9	50	130	3070	1	
616	GIVAUDAN CORP. CLIFTON. PASSAIC CO.	404947	740751	4.2	00	130	3070	1	E
629	LODI/MAYWOOD RADIOLOGICAL CONTAM.. BERGEN CO.(SEE ALSO 500)	405345	740405	2.3	67	120	3070	1	E
660	SCIENTIFIC CHEMICAL PROCESSING, CARLSTADT, BERGEN CO.	404928	740427	2.7	00	0110	3070	1	C
670	SKETCHLEY SERVICES. BERGEN CO.	405255	740615	2.5	00	0110	3070	1	G
671	MORTON THIOKOL INC., PATERSON. PASSAIC CO.	405424	740805	4.8	13	130	3070	2	H
688	DIAMOND SHAMROCK, CARLSTADT, BERGEN CO.	405017	740458	1.9	50	103	101	1	
762	ANDRILL OIL CORP—LITTLE FERRY TER	405018	740158	2.3	00	0103	0101	1	B
775	COSAN CHEMICAL CORP. CARLSTADT. BERGEN CO.	405010	740503	2.1	00	0120	3070	1	A
776	CURTISS-WRIGHT CORP	405144	740547	1.7	00	3070	0	1	A
828	POUGHKEEPSIE FINISHING CORP (2ND CASE?). CLIFTON	405157	740857	4.5	00	0103	3070	1	B
832	SAM GABBAY. INC.. FAIRVIEW. BERGEN CO.	404919	740037	3.9	00	0102	0	4	B
837	SPONGE CLEAN PRODUCTS CO. INC. N. BERGEN. HUDSON CO.	404813	740114	4.6	00	0101	3070	1	B
848	VORAC CO—DIV OF SEAGRAVE COATINS. CARLSTADT, BERGEN CO.	404922	740405	2.7	00	0103	0101	1	B
851	WHIPPANY PAPER BOARD CO. INC	405243	740716	3.2	00	0103	3070	1	B
867	GENERALFOAM CORP, E. RUTHERFORD. BERGEN CO.	404932	740527	2.9	63	0103	0101	1	
868	TEXACO AT MAIN & PARK ST., RIDGEFIELD PARK. BERGEN CO.	405107	740130	2.1	51	3070	0	1	B
889	J.B.M.T. PRINTING. E. RUTHERFORD. BERGEN CO.	404925	740535	3.1	00	0101	0100	1	B
970	E.C. ELECTROPLATING. GARFIELD. BERGEN CO.	405220	740610	2.2	0	0	0	3	
972	VALVE GAS STATION. PARAMUS. BERGEN CO.	4055	740400	3.8	0	0	0	3	
1114	RIDGEFIELD PARK EXXON, RIDGEFIELD PARK, BERGEN CO.	405102	740155	1.8	63	0103	0100	1	B
1115	SHOTMEYER BROS. MOBIL. PARAMUS	405430	740415	3.2	51			1	B
1161	GTE-SYLVANIA, TETERBORO. BERGEN CO.	405330	740308	2.1	53			3	
1162	UNITED WIRE HANGER CORP. HASBROUCK HEIGHTS. BERGEN CO.	405100	740400	0.9	52			3	
1164	PLAZA AMOCO/KECKEY'S EXXON. SECAUAUS. HUDSON CO.	404729	740332	4.9				3	
1190	ITT AVIONICS, 100 KINGSLAND RD., CLIFTON, PASSAIC CO.	404945	740815	4.5	04			3	
1219	EMPIRE OVERALL, ELMWOOD PARK, BERGEN CO.	405329	740645	3.3	00	0110	3070	1	C
1222	WALLINGTON WATER DEPT., WALLINGTON, BERGEN CO.	405000	740600	2.8	00	0120	3070	1	C
1244	ROY'S AMOCO, HACKENSACK, BERGEN CO.	405426	740230	3.3	51	0110	3070	1	C
1246	STONE NYCAL, S. HACKENSACK, BERGEN CO.	405210	740249	1.0	63	0100	3070	1	C
1251	GARFIELD WATER DEPARTMENT, GARFIELD, BERGEN CO.	405256	740722	3.4	01	0120	3070	1	
1258	STOR DYNAMICS. ELMWOOD PARK. BERGEN CO.	405439	740638	4.2	00	0130	3070	1	E
1300	WESTGATE CONDOMINIUM CORP., FORT LEE, BERGEN CO.	405114	735910	4.1	52	0100	3050	1	B

Number of Observations: 44

NUMBER	NAME	SOURCEID	LGCID	LAT	LON	LLACC	DISTANCE	COUNTY	MUN	DEPTH	GEO1	GEO2	CAPACITY
5198	WALLINGTON BOROUGH	2603933	DUL	405131	740619		2.2	03	65	400	GTRB		140
2055P	GANES CHEMICAL, INC.	2600005	4	405024	740607	F	2.5	03	05	526	GTRB		80
2172P	PARK 80-KIDDIE ASSOCIATES	2604104	4	405412	740600	S	3.4	03	57	300	GTRB		
5127	LODI BOROUGH	2601037	TERRACE	405157	740558		1.9	03	31	607	GTRB		190
2055P	GANES CHEMICAL, INC.	4600080	2	405026	740557	F	2.4	03	05	490	GTRB		200
2055P	GANES CHEMICAL, INC.	2604277	5	405025	740557	F	2.4	03	05	430	GTRB		30
2246P	FARMLAND DAIRIES INC.	2604169	1	405134	740555	U	1.8	03	65	600	GTRB		200
2246P	FARMLAND DAIRIES INC.	2304250	2	405134	740555	U	1.8	03	65	500	GTRB		185
10060W	CARLSTADT - E. RUTHERFORD BOE	2603920	1	404931	740552	F	3.1	03	12	225	GTRB		125
5127	LODI BOROUGH	2601010	GARFIELD	405218	740538		1.7	03	31	459	GTRB		150
5127	LODI BOROUGH	4600068	ARNOT ST.	405240	740518		1.7	03	31	300	GTRB		160
2035P	ARCOLA COUNTRY CLUB	4600126	3	405533	740515	S	4.6	03	46	200	GTRB		160
2035P	ARCOLA COUNTRY CLUB	2603872	4	405537	740509	S	4.6	03	46	208	GTRB		125
5127	LODI BOROUGH	4600069	4	405249	740502		1.6	03	31	307	GTRB		295
5127	LODI BOROUGH	4600070	5	405249	740502		1.6	03	31	300	GTRB		355
5127	LODI BOROUGH	4600071	7	405249	740502		1.6	03	31	332	GTRB		355
2211P	HENKEL PROCESS CHEMICALS, INC.	4600125	1	405000	740500		2.2	03	05	170	GOSD		600
5087	HACKENSACK WATER COMPANY	2603017	ROCHELLE P	405458	740449		3.8	03	54	473	GTRB		200
4041PS	STEPAN CHEMICAL COMPANY	SADDLE RIVER		405355	740447		2.6	03	54		SFSAD		2000
5127	LODI BOROUGH	2603183	CORABELLE	405231	740435		1.1	03	31	470	GTRB		200
2035P	ARCOLA COUNTRY CLUB	POND	1	405535	740430	U	4.5	03	46	5	GTRB		200
2035P	ARCOLA COUNTRY CLUB	POND	2	405535	740430	U	4.5	03	46	15	GTRB		200
5127	LODI BOROUGH	4600072	LAWRENCE	405217	740420	U	0.8	03	31	373	GTRB		500
5127	LODI BOROUGH	4600073	COLUMBIA	405240	740410	U	1.1	03	31	409	GTRB		375
2372P	YOO-HOO CHOCOLATE BEV. CORP.	2602067	1	404946	740350		2.3	03	05	303	GTRB		90
2372P	YOO-HOO CHOCOLATE BEV. CORP.	2602933	2	404946	740350		2.3	03	05	393	GTRB		50
2372P	YOO-HOO CHOCOLATE BEV. CORP.	2603053	3	404946	740350		2.3	03	05	378	GTRB		55
2230P	HOFFMAN LAROCHE INC.	2406268	1	405047	740345	T	1.1	41	03	140	GO		700
2057P	SPINNERIN YARN CO., INC.	4600177	0	405208	740309	F	0.7	03	59	404	GTRB		65
2057P	SPINNERIN YARN CO., INC.	2603018	3	405210	740309	F	0.8	03	59	400	GTRB		50
2057P	SPINNERIN YARN CO., INC.	4600083	2	405210	740305	F	0.8	03	59	435	GTRB		0
2057P	SPINNERIN YARN CO., INC.	4600176	4	405208	740305	F	0.8	03	59	400	GTRB		140
2057P	SPINNERIN YARN CO., INC.	2411599	5 PROPOSED	405210	740305	F	0.8	03	59		GTRB		
5127	LODI BOROUGH	2603185	HOME PLACE	405439	740301		3.4	03	31	450	GTRB		175
5087	HACKENSACK WATER COMPANY	2600914	1	405357	740216		2.9	03	23	168	GOSD		1550
5087	HACKENSACK WATER COMPANY	2601034	2	405355	740215		2.9	03	23	190	GOSD		1400
5086	HACKENSACK WATER COMPANY	4600065	2	405221	740157		1.8	03	04	550	GTFB		180
5086	HACKENSACK WATER COMPANY	4600067	4	405242	740145		2.1	03	04	235	GTRB		
5086	HACKENSACK WATER COMPANY	4600066	3	405248	740143		2.2	03	04	350	GTRB		175
2082P	LOWE PAPER COMPANY	4600095	2	405005	740045	F	3.3	03	49	484	GTRBS		50
2082P	LOWE PAPER COMPANY	4600096	3	405005	740045	F	3.3	03	49	492	GTRBS		75
2082P	LOWE PAPER COMPANY	4600097	4	405005	740045	F	3.3	03	49	597	GTRBS		100
2082P	LOWE PAPER COMPANY	4600098	5	405005	740045	F	3.3	03	49	500	GTRBS		80
2082P	LOWE PAPER COMPANY	4600099	6	405005	740045	F	3.3	03	49	600	GTRBS		50
2156P	BERGEN COUNTY PARK COMMISSION	2604300	WELL 2	405105	740020	F	3.1	03	45	485	GTRB		125
2156P	BERGEN COUNTY PARK COMMISSION	POND	1	405300	740000	S	3.6	03	60	13	GOSD		750
2156P	BERGEN COUNTY PARK COMMISSION	2604559	WELL 1	405210	735940	F	5.7	03	29	430	GTRB		250
2244P	ENGLEWOOD HOSPITAL ASSOCIATION	2602436	4	405410	735812	F	5.7	03	15	300	GTRB		100
5282	GARFIELD WATER DEPARTMENT	2604103	6	405521	735812		6.4	03	21	300	GTRB		150
2043P	JOSEPH E. SALVATORE, M.D.	4600001	1	405440	735810	S	6.0	03	15	158	GTRB		80
2244P	ENGLEWOOD HOSPITAL ASSOCIATION	2604217	5	405412	735809	S	5.7	03	15	230	GTRB		200
2244P	ENGLEWOOD HOSPITAL ASSOCIATION	2604489	6	405413	735809	F	5.7	03	15	300	GTRB		200

Number of Observations: 108

Page 1 of PRELIMINARY SURVEY OF WATER WITHDRAWAL POINTS WITHIN 5.0 MILES OF 405144 LAT. 740349 LON. (IN ORDER BY DECREASING LONGITUDE) - 10/06/89

NUMBER	NAME	SOURCEID	LOCID	LAT	LON	LLACC	DISTANCE	COUNTY	MUN	DEPTH	GEO1	GEO2	CAPACITY
2233P	HOFFMANN-LAROCHE INC.	4600156	32	405015	740927	F	5.2	31	02	650	GTRB		260
2233P	HOFFMANN-LAROCHE INC.	4600155	20	405000	740919	F	5.2	13	16	402	GTRB		100
2233P	HOFFMANN-LAROCHE INC.	4600157	33	405003	740915	F	5.1	31	02		GTRB		165
2233P	HOFFMANN-LAROCHE INC.	4600158	37	404958	740907	F	5.1	31	02	720	GTRB		300
2261P	FRITZCHE DODGE & OLCOTT	2602812	2	405212	740845	U	4.3	31	02	600	GTRB		218
5317	FAIR LAWN BOROUGH	2600465	16	405540	740830		6.1	03	17	413	GTRB		140
5317	FAIR LAWN BOROUGH	2600393	15	405535	740825	F	6.0	03	17	402	GTRB		500
2066P	MILES LABORATORIES	2603833	2	405248	740824	M	4.2	31	02	300	GTRB		200
2066P	MILES LABORATORIES	2604613	3	405247	740821	M	4.1	31	02	408	GTRB		200
2016P	ITT AVIONICS DIVISION	2601834	1	404930	740820	T	4.7	13	16	500	GTRB		150
2016P	ITT AVIONICS DIVISION	2601835	2	404930	740820		4.7	13	16	450	GTRB		150
2016P	ITT AVIONICS DIVISION	2601905	3	404930	740820		4.7	13	16	500	GTRB		150
5317	FAIR LAWN BOROUGH	2601197	19	405438	740818		5.1	03	17	400	GTRB		260
2016P	ITT AVIONICS DIVISION	2604692	4/SEALED	404912	740812		4.5	13	16	500	GTRB		200
4006FS	DUNDEE WATER POWER & LAND CO.	DUNDEE LAKE	MARCAL CO.	405405	740754	T	4.5	03	11		SPPAS		
2100P	MARCAL PAPER MILLS, INC.	4600008	1	405412	740752	F	4.5	03	11	305	GTRB		150
2100P	MARCAL PAPER MILLS, INC.	4600009	2	405412	740752	F	4.5	03	11	330	GTRB		280
2100P	MARCAL PAPER MILLS, INC.	4600010	3	405412	740752	F	4.5	03	11	325	GTRB		250
2100P	MARCAL PAPER MILLS, INC.	4600011	4	405412	740752	F	4.5	03	11	282	GTRB		80
2100P	MARCAL PAPER MILLS, INC.	4600012	5	405412	740752	F	4.5	03	11		GTRB		125
2100P	MARCAL PAPER MILLS, INC.	4600013	6	405412	740752	F	4.5	03	11		GTRB		300
5198	WALLINGTON BOROUGH	4600075	8	405125	740750		3.5	03	65	503	GTRB		80
5198	WALLINGTON BOROUGH	4600074	5	405125	740750		3.5	03	65	506	GTRB		150
2092P	GIVAUDAN CORPORATION	4600006	6	404936	740745	F	4.2	31	02	297	GTRB		235
2092P	GIVAUDAN CORPORATION	4600007	7	404940	740745	F	4.2	31	02	250	GTRB		110
4035FS	KALAMA CHEMICAL, INC.	PASSAIC RIVER		405206	740745	T	3.5	03	21		SPPAS		
4006FS	DUNDEE WATER POWER & LAND CO.	DUNDEE LAKE	G.S. PAPER	405308	740742	T	3.8	03	21		SPPAS		
5282	GARFIELD WATER DEPARTMENT	2604064	8C	405250	740742		3.6	03	21	405	GTRB		400
2370P	FISHER SCIENTIFIC CO. CHEM DIV	2605038	PW2	405545	740740		5.7	03	17	335	GTRB		60
2044P	GRAND UNION CO.	4600002		404752	740735	S	5.6	03	39	300	GTRB		80
4006FS	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	WHIPPANY	405208	740727	T	3.2	31	02		SP		
1101D	FOSTER WHEELER PASSAIC, INC.			405220	740718		3.1	31	07	46	GD		175
2313P	PENCO OF LYNDHURST INC.	4600173	2	404845	740715		4.6	03	32	313	GTRB		185
2313P	PENCO OF LYNDHURST INC.	2601699	3	404845	740715	F	4.6	03	32	410	GTRB		150
2313P	PENCO OF LYNDHURST INC.	4600172	1	404845	740714		4.5	03	32	267	GTRB		110
4006FS	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	OKONITE CO	405143	740712	T	3.0	31	07		SP		
5198	WALLINGTON BOROUGH	2603027	LESTER ST	405125	740710		3.0	03	65	400	GTRB		130
2313P	PENCO OF LYNDHURST INC.	2603804	4	404840	740705	F	4.5	03	32	352	GTRB		185
2093P	ORVAL KENT FOOD COMPANY, INC.	2604317	1	405045	740704	F	3.1	03	12	580	GTRB		150
4006FS	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	TUCK IND.	405136	740704	T	2.8	31	07		SP		
4006FS	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	PANTASOTE	405204	740704	T	2.9	31	02		SP		
4006FS	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	CHELTON CO	405208	740702	T	2.9	31	02		SP		
4006FS	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	PASSAIC IN	405218	740702	T	2.9	31	02		SP		
2094P	D.A.K. MANUFACTURING CORP.	2605037	4	405353	740657	F	3.7	03	11	250	GTRB		60
2093P	ORVAL KENT FOOD COMPANY, INC.	2604382	3	405035	740655	T	3.0	03	12	470	GTRB		430
2094P	D.A.K. MANUFACTURING CORP.	2600466	1	405404	740655	F	3.8	03	11		GTRB		
2094P	D.A.K. MANUFACTURING CORP.	4600210	2	405404	740655	U	3.8	03	11		GTRB		
2094P	D.A.K. MANUFACTURING CORP.	4600211	3	405404	740655	U	3.8	03	11		GTRB		
2093P	ORVAL KENT FOOD COMPANY, INC.	2604341	2	405045	740654	S	2.9	03	12	300	GTRB		150
5282	GARFIELD WATER DEPARTMENT	2604016	1A	405256	740651		3.0	03	21	400	GTRB		300
5282	GARFIELD WATER DEPARTMENT	2604063	2	405312	740648	U	3.1	03	21	475	GTRB		150
2049P	SIKA CORPORATION	2604036	1	404825	740638		4.5	03	32	302	GTRB		220
5282	GARFIELD WATER DEPARTMENT	2604010	5	405209	740638		2.5	03	21	276	GTRB		150
2172P	PARK 80-KIDDIE ASSOCIATES	2604234	1	405408	740630	S	3.6	03	57	400	GTRB		300
2172P	PARK 80-KIDDIE ASSOCIATES	2604235	2	405410	740629	S	3.6	03	57	400	GTRB		300
2172P	PARK 80-KIDDIE ASSOCIATES	2605301	3	405410	740629	S	3.6	03	57	300	GTRB		0

NUMBER	NAME	SOURCE ID	LOCID	LAT	LON	LLACC	DISTANCE	COUNTY	MUN	DEPTH	GEO1	GEO2	CAPACITY
	HOFFMANN-LAROCHE INC.	4600158	37	404958	740907	F	5.1	31	02	720	GTRB		300
2244P	ENGLEWOOD HOSPITAL ASSOCIATION	2602436	4	405410	735812	F	5.7	03	15	300	GTRB		100
	ENGLEWOOD HOSPITAL ASSOCIATION	2604217	5	405412	735809	S	5.7	03	15	230	GTRB		200
	ENGLEWOOD HOSPITAL ASSOCIATION	2604489	6	405413	735809	F	5.7	03	15	300	GTRB		200
2246P	FARMLAND DAIRIES INC.	2604169	1	405134	740555	U	1.8	03	65	600	GTRB		200
	FARMLAND DAIRIES INC.	2304250	2	405134	740555	U	1.8	03	65	500	GTRB		185
2261P	FRITZCHE DODGE & OLCOTT	2602812	2	405212	740845	U	4.3	31	02	600	GTRB		218
2313P	PENCO OF LYNDHURST INC.	4600172	1	404845	740714		4.5	03	32	267	GTRB		110
	FENCO OF LYNDHURST INC.	4600173	2	404845	740715		4.6	03	32	313	GTRB		185
	FENCO OF LYNDHURST INC.	2601699	3	404845	740715	F	4.6	03	32	410	GTRB		150
	FENCO OF LYNDHURST INC.	2603804	4	404840	740705	F	4.5	03	32	352	GTRB		185
2370P	FISHER SCIENTIFIC CO. CHEM DIV	2605038	FW2	405545	740740		5.7	03	17	335	GTRB		60
2372P	YOO-HOO CHOCOLATE BEV. CORP.	2602067	1	404946	740350		2.3	03	05	303	GTRB		90
	YOO-HOO CHOCOLATE BEV. CORP.	2602933	2	404946	740350		2.3	03	05	393	GTRB		50
	YOO-HOO CHOCOLATE BEV. CORP.	2603053	3	404946	740350		2.3	03	05	378	GTRB		55
4006PS	DUNDEE WATER POWER & LAND CO.	DUNDEE LAKE	S.S. PAPER	405308	740742	T	3.8	03	21		SPPAS,		
	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	WHIPPANY	405208	740727	T	3.2	31	02		SP		
	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	CHELTON CO	405208	740702	T	2.9	31	02		SP		
	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	OKONITE CO.	405143	740712	T	3.0	31	07		SP		
	DUNDEE WATER POWER & LAND CO.	DUNDEE LAKE	MARCAL CO.	405405	740754	T	4.5	03	11		SPPAS		
	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	PASSAIC IN	405218	740702	T	2.9	31	02		SP		
	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	TUCK IND.	405136	740704	T	2.8	31	07		SP		
	DUNDEE WATER POWER & LAND CO.	DUNDEE CAN	PANTASOTE	405204	740704	T	2.9	31	02		SP		
4025PS	KALAMA CHEMICAL, INC.	PASSAIC RIVER		405206	740745	T	3.5	03	21		SPPAS		
4041PS	STEPAN CHEMICAL COMPANY	SADDLE RIVER		405355	740447		2.6	03	54		SPSAD		2000
5086	HACKENSACK WATER COMPANY	4600065	2	405221	740157		1.8	03	04	550	GTRB		180
	HACKENSACK WATER COMPANY	4600066	3	405245	740143		2.2	03	04	350	GTRB		175
	HACKENSACK WATER COMPANY	4600067	4	405242	740145		2.1	03	04	225	GTRB		
5087	HACKENSACK WATER COMPANY	2600914	1	405357	740216		2.9	03	23	169	GOSD		1550
	HACKENSACK WATER COMPANY	2601034	2	405355	740215		2.9	03	23	190	GOSD		1400
	HACKENSACK WATER COMPANY	2603017	ROCHELLE P	405458	740449		3.8	03	54	473	GTRB		200
5127	LODI BOROUGH	4600068	ARNOT ST.	405240	740518		1.7	03	31	300	GTRB		160
	LODI BOROUGH	4600069	4	405249	740502		1.6	03	31	307	GTRB		295
	LODI BOROUGH	4600070	5	405249	740502		1.6	03	31	300	GTRB		355
	LODI BOROUGH	4600071	7	405249	740502		1.6	03	31	332	GTRB		355
	LODI BOROUGH	4600072	LAWRENCE	405217	740420	U	0.8	03	31	373	GTRB		500
	LODI BOROUGH	4600073	COLUMBIA	405240	740410	U	1.1	03	31	409	GTRB		375
	LODI BOROUGH	2601037	TERRACE	405157	740558		1.9	03	31	607	GTRB		190
	LODI BOROUGH	2601010	GARFIELD	405218	740538		1.7	03	31	459	GTRB		150
	LODI BOROUGH	2603185	HOME PLACE	405439	740301		3.4	03	31	450	GTRB		175
	LODI BOROUGH	2603183	CORABELLE	405231	740435		1.1	03	31	470	GTRB		200
5198	WALLINGTON BOROUGH	2603933	DUL	405131	740619		2.2	03	65	400	GTRB		140
	WALLINGTON BOROUGH	2603027	LESTER ST	405125	740710		3.0	03	65	400	GTRB		130
	WALLINGTON BOROUGH	4600075	8	405125	740750		3.5	03	65	503	GTRB		80
	WALLINGTON BOROUGH	4600074	5	405125	740750		3.5	03	65	506	GTRB		150
5292	GARFIELD WATER DEPARTMENT	2604016	1A	405256	740651		3.0	03	21	400	GTRB		300
	GARFIELD WATER DEPARTMENT	2604063	2	405312	740648	U	3.1	03	21	475	GTRB		150
	GARFIELD WATER DEPARTMENT	2604010	5	405209	740638		2.5	03	21	276	GTRB		150
	GARFIELD WATER DEPARTMENT	2604103	6	405521	735812		6.4	03	21	300	GTRB		150
	GARFIELD WATER DEPARTMENT	2604064	8C	405250	740742		3.6	03	21	405	GTRB		400
5317	FAIR LAWN BOROUGH	2600465	16	405540	740830		6.1	03	17	413	GTRB		140
	FAIR LAWN BOROUGH	2601197	19	405438	740818		5.1	03	17	400	GTRB		260
	FAIR LAWN BOROUGH	2600393	15	405535	740825	F	6.0	03	17	402	GTRB		500

NUMBER	NAME	SOURCEID	LOCID	LAT	LON	LLACC	DISTANCE	COUNTY	MUN	DEPTH	GEO1	GEO2	CAPACITY
10060W	CARLSTADT - E. RUTHERFORD BOE	2603920	1	404931	740552	F	3.1	03	12	225	GTRB		125
1101D	FOSTER WHEELER PASSAIC, INC.			405220	740718		3.1	31	07	46	GD		175
2016P	ITT AVIONICS DIVISION	2601834	1	404930	740820	T	4.7	13	16	500	GTRB		150
	ITT AVIONICS DIVISION	2601835	2	404930	740820		4.7	13	16	450	GTRB		150
	ITT AVIONICS DIVISION	2601905	3	404930	740820		4.7	13	16	500	GTRB		150
	ITT AVIONICS DIVISION	2604692	4/SEALED	404912	740812		4.8	13	16	500	GTRB		200
2035P	ARCOLA COUNTRY CLUB	4600126	3	405533	740515	S	4.6	03	46	200	GTRB		160
	ARCOLA COUNTRY CLUB	2603872	4	405537	740509	S	4.6	03	46	203	GTRB		125
	ARCOLA COUNTRY CLUB	POND	1	405535	740430	U	4.5	03	46	5	GTRB		200
	ARCOLA COUNTRY CLUB	POND	2	405535	740430	U	4.5	03	46	15	GTRB		200
2043P	JOSEPH E. SALVATORE, M.D.	4600001	1	405440	735810	S	6.0	03	15	158	GTRB		80
2044P	GRAND UNION CO.	4600002		404752	740738	S	5.6	03	39	300	GTRB		80
2049P	SIKA CORPORATION	2604036	1	404825	740638		4.5	03	32	302	GTRB		220
2055P	GANES CHEMICAL. INC.	4600080	2	405026	740557	F	2.4	03	05	490	GTRB		200
	GANES CHEMICAL, INC.	2600005	4	405024	740607	F	2.5	03	05	526	GTRB		80
	GANES CHEMICAL, INC.	2604277	5	405025	740557	F	2.4	03	05	430	GTRB		30
2057P	SPINNERIN YARN CO., INC.	4600177	0	405208	740309	F	0.7	03	59	404	GTRB		65
	SPINNERIN YARN CO., INC.	4600083	2	405210	740305	F	0.8	03	59	435	GTRB		0
	SPINNERIN YARN CO., INC.	2603012	3	405210	740309	F	0.8	03	59	400	GTRB		50
	SPINNERIN YARN CO., INC.	4600176	4	405208	740305	F	0.8	03	59	400	GTRB		140
	SPINNERIN YARN CO., INC.	2611599	5 PROPOSED	405210	740305	F	0.8	03	59		GTRB		
2066P	MILES LABORATORIES	2603833	2	405248	740824	M	4.2	31	02	300	GTRB		200
	MILES LABORATORIES	2604613	3	405247	740821	M	4.1	31	02	408	GTRB		200
2082P	LOWE PAPER COMPANY	4600095	2	405005	740045	F	3.3	03	49	484	GTRBS		50
	LOWE PAPER COMPANY	4600096	3	405005	740045	F	3.3	03	49	492	GTRBS		75
	LOWE PAPER COMPANY	4600097	4	405005	740045	F	3.3	03	49	597	GTRBS		100
	LOWE PAPER COMPANY	4600098	5	405005	740045	F	3.3	03	49	500	GTRBS		80
	LOWE PAPER COMPANY	4600099	6	405005	740045	F	3.3	03	49	600	GTRBS		50
2092P	GIVAUDAN CORPORATION	4600006	6	404936	740745	F	4.2	31	02	297	GTRB		235
	GIVAUDAN CORPORATION	4600007	7	404940	740745	F	4.2	31	02	250	GTRB		110
2093P	ORVAL KENT FOOD COMPANY, INC.	2604317	1	405045	740704	F	3.1	03	12	580	GTRB		150
	ORVAL KENT FOOD COMPANY. INC.	2604341	2	405045	740654	S	2.9	03	12	300	GTRB		150
	ORVAL KENT FOOD COMPANY. INC.	2604382	3	405035	740655	T	3.0	03	12	470	GTRB		430
2094P	D.A.K. MANUFACTURING CORP.	2600466	1	405404	740655	F	3.8	03	11		GTRB		
	D.A.K. MANUFACTURING CORP.	4600210	2	405404	740655	U	3.8	03	11		GTRB		
	D.A.K. MANUFACTURING CORP.	4600211	3	405404	740655	U	3.8	03	11		GTRB		
	D.A.K. MANUFACTURING CORP.	2605037	4	405353	740657	F	3.7	03	11	250	GTRB		60
2100P	MARCAL PAPER MILLS. INC.	4600008	1	405412	740752	F	4.5	03	11	308	GTRB		150
	MARCAL PAPER MILLS. INC.	4600009	2	405412	740752	F	4.5	03	11	330	GTRB		280
	MARCAL PAPER MILLS. INC.	4600010	3	405412	740752	F	4.5	03	11	325	GTRB		250
	MARCAL PAPER MILLS. INC.	4600011	4	405412	740752	F	4.5	03	11	282	GTRB		80
	MARCAL PAPER MILLS. INC.	4600012	5	405412	740752	F	4.5	03	11		GTRB		125
	MARCAL PAPER MILLS, INC.	4600013	6	405412	740752	F	4.5	03	11		GTRB		300
2156P	BERGEN COUNTY PARK COMMISSION	POND	1	405300	740000	S	3.6	03	60	13	GQSD		750
	BERGEN COUNTY PARK COMMISSION	2604559	WELL 1	405210	735940	F	3.7	03	29	430	GTRB		250
	BERGEN COUNTY PARK COMMISSION	2604300	WELL 2	405105	740020	F	3.1	03	45	485	GTRB		125
2172P	PARK 80-KIDDIE ASSOCIATES	2604234	1	405408	740630	S	3.6	03	57	400	GTRB		300
	PARK 80-KIDDIE ASSOCIATES	2604235	2	405410	740629	S	3.6	03	57	400	GTRB		300
	PARK 80-KIDDIE ASSOCIATES	2605301	3	405410	740629	S	3.6	03	57	300	GTRB		0
	PARK 80-KIDDIE ASSOCIATES	2604104	4	405412	740600	S	3.4	03	57	300	GTRB		
2211P	HENKEL PROCESS CHEMICALS. INC.	4600125	1	405000	740500		2.2	03	05	170	GQSD		600
2230P	HOFFMAN LAROCHE INC.	2406268	1	405047	740345	T	1.1	41	03	140	GD		700
2233P	HOFFMANN-LAROCHE INC.	4600155	20	405000	740919	F	5.2	13	16	402	GTRB		100
	HOFFMANN-LAROCHE INC.	4600156	32	405015	740927	F	5.2	31	02	650	GTRB		260
	HOFFMANN-LAROCHE INC.	4600157	33	405003	740915	F	5.1	31	02		GTRB		165

ATTACHMENT A

Pron - M
02-62-04

Let's protect our earth

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF HAZARDOUS WASTE MANAGEMENT
John J. Trela, Ph.D., Acting Director
401 East State St.
CN 028
Trenton, N.J. 08625
609 - 633 - 1408

JUN 24 1987

Mr. William Hooper, Manager
Plant Engineering
Allied Bendix Aerospace
Teterboro, NJ 07860

Dear Mr. Hooper:

RE: Reclassification of Allied Bendix Aerospace, Teterboro, EPA ID No. NJD 078 714 433

The Bureau of Hazardous Waste Engineering (the Bureau) has reviewed the closure certification for the hazardous waste storage tanks submitted by Allied Bendix Aerospace dated July 18, 1986. The Division of Hazardous Waste Management inspected the subject facility on October 21, 1986. The Department has determined that the subject three hazardous waste storage tanks have been closed in accordance with the approved closure plan dated April 2, 1986 and N.J.A.C. 7:26-9.8.

The Bureau has reviewed the Part A application submitted by Allied Bendix Aerospace, Teterboro plant, to the USEPA and finds that the following activities are included in the subject facility's Part A application.

1. Hazardous Waste Storage in Containers (S01)-3,300 gallons.

2. Hazardous Waste Treatment in Tanks (T01)-220,000 gallons per day.

3. Hazardous Waste Storage in Tanks (S02)-26,300 gallons.

The S01 activities at this location were classified solely as generator of hazardous waste and T01 activities were classified as Industrial Waste Management Facility (IWMF) by the Department on November 18, 1983. As indicated above the S02 activity at the subject facility has been closed and certified by Allied Bendix Aerospace.

However, please be advised that submission of a ground water monitoring plan in accordance with N.J.A.C. 7:14A-6 for the underground hazardous waste storage tanks may be required. The Bureau is sending this information to:

Robert Berg, Chief
Bureau of Ground Water Quality Management
Division of Water Resources

ATTACHMENT A

JUN 24 1987

New Jersey Department of Environmental Protection
401 East State Street
Trenton, New Jersey 08625
Telephone: (609) 292-0424

Please contact the above Bureau to ensure compliance with the Division of Water Resources's regulations for the underground tanks used to store hazardous waste in the past.

Your company's hazardous waste facility above is no longer Included in DEP's list of "existing facilities" (see N.J.A.C. 7:26-1,4 and 12.3) and therefore does not need to conform with the interim operating requirements of N.J.A.C. 7:26-1 et seq. for "existing facilities". To operate a hazardous waste facility without prior approval from the DEP is a violation of the Solid Waste Management Act. N.J.S.A. I3:1E-1 et seq.

This written acknowledgement of the exclusion of the subject company from TSD facility requirements under N.J.A.C. 7:26-1 et seq. is based expressly on the review of the aforementioned correspondence. This letter makes no claim as to the extent and physical condition of the actual hazardous waste activities not occurring at the site mentioned above.

The issuance of this delisting letter by the Department does not indicate, or imply, and should not be construed as a waiver of any requirements pursuant to the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq. and regulations promulgated thereunder concerning the New Jersey Pollutant Discharge Elimination System, N.J.A.C. 7:14-1 et seq. If your facility is in any of the regulated categories identified in the ahove cited regulations, you are hereby directed to apply for any and all permits necessary within ninety (or 180 days - at the option of DWR) to the Bureau of Ground Water Discharge Permits, GN 029, Trenton, NJ 08625. Applications may be obtained by calling (609) 292-0424.

If you have any questions on this matter, please feel free to contact Ali Chaudhry at (609) 292-9880.

Very truly yours,

Ernest J Kuhlwein Jr

Ernest J. Kuhlwein, Jr., Acting Chief
Bureau of Hazardous Waste Engineering

EP11/vb
c: Lori Amato, USEPA
Robert Berg, DWR
Karl Delaney, BCTS
Tom Sherman, BHWE

ATTACHMENT A2

ATTACHMENT B

Let's protect our earth

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTL .ION
CN 402
Trenton, N.J. 08625

PERMIT

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to the further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit.

Permit No.	Issuance Date	Effective Date	Expiration Date
NJ0002097			January 14, 1989

Name and Address of Applicant	Location of Activity/Facility	Name and Address of Owner
The Bendix Corporation U.S. Highway 46 Teterboro, NJ 07608	US Highway 46 Teterboro Borough, Bergen County New Jersey	Same as applicant

Issuing Division	Type of Permit	Statute(s)	Application No.
Water Rescurces	NJPDES/DSW-SIU Modification	N.J.S.A. 58:10A-1 et seq.	

This pennit grants permission to:

Discharge pretreated industrial wastes into the Bergen County Utilities Authority via Teterboro sewers, in accordance with effluent conditions, monitoring requirements, and other conditions set forth in modified Pages 18 and 19, Part IV hereof and to Berry's Creek in accordance with additional pages 25, 26, 27, and 28 of Part V hereof.

This Permit replaces Pages 18 and 19 of the NJPDES/DSW-SIU Permit Issued November 29, 1983, nd amnends pages 25, 26, 27, and 28 thereto.

Remaining requirements and limitations of that Permit or of the October 31, 1984 NJPDES/DSW/IWMF/SIU Permit Modification are unchanged by this NJPDES/DSW-SIU Modification.

ATTACHMENT B

Approved by the Department of Environmental Protection
By the Authorrty of:
John W. Gaston Jr., P.E.
Director
Division of Water Resources

Arnold Schiffman, Administrator
Water Quality Management

DATE

* The word *permit* means *"approval, certification, registration, etc."*

(GENERAL CONDITIONS ARE ON THE REVERSE SIDE.)

ATTACHMENT C

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF WASTE MANAGEMENT

HAZARDOUS SITE MITIGATION ADMINISTRATION

ON 028, Trenton, N.J. 08625

MARWAN M. SADAT, P.E.
DIRECTOR

JORGE H. BERKOWITZ, PH.D.
ADMINISTRATOR

IN THE MATTER OF	:	ADMINISTRATIVE
ALLIED-SIGNAL INC.	:	CONSENT ORDER
ECRA CASE #'s85820, 85821, 85822	:	
85823, 85824, 85825, 85826, 86049	:	
86103	:	

The following FINDINGS are made and ORDER is issued pursuant to the authority vested In the Commissioner of the New Jersey Department of Environmental Protection (hereinafter "NJDEP") by N.J.S.A. 13:1D-1 et seq. and the Environmental Cleanup Responsibility Act, N.J.S.A. 13:1K-6 et seq., and duly delegated to the Assistant Director for Enforcement and Field Operations within the Division of Hazardous Waste Management pursuant to N.J.S.A. 13:1B-4.

FINDINGS

1. The Environmental Cleanup Responsibility Act, N.J.S.A. 13:1K-6 et seq. ("ECRA" or "the Act"), was signed into New Jersey State Law by Governor Thomas H. Kean on September 2, 1983, and took effect on December 31, 1983.

2. ECRA required the NJDEP to adopt rules and regulations to implement the Act. On March 6, 1984, NJDEP adopted the Interim ECRA Regulations, N.J.A.C. 7:1-3 ("Regulations") in compliance with the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq., upon acceptance for filing by the Office of Administrative Law pursuant to N.J.A.C. 1:30-4.4(d).

3. ECRA requires that the owner or operator of an Industrial establishment planning to sell or transfer operations (a) notify the NJDEP in writing within five (5) days of the execution pursuant to N.J.A.C. 7:1-3.7, (b) submit within sixty (60) days prior to transfer of title a Negative Declaration or Cleanup Plan to the NJDEP for approval, and (c) obtain, upon approval of any necessary Cleanup Plan by the NJDEP, a surety bond or other financial security approved by the NJDEP guaranteeing performance of the Cleanup Plan In an amount equal to the cost estimate for the approved Cleanup Plan.

4. N.J.S.A. 13:1K-13 provides that failure to submit a Negative Declaration or Cleanup Plan pursuant to ECRA is grounds for voiding the sale by NJDEP. Any person who knowingly gives or causes to be given any false Information or who falls to comply with the provisions of ECRA is liable for a penalty of not more than $25,000.00 for each occurrence, and each day of a violation of a continuing nature constitutes an additional and separate offense. Furthermore, any officer or management official of an industrial

establishment who knowingly directs or authorizes the violation of any provisions of the Act shall be personally liable for the $25,000.00 penalties for each violation described above.

5. Allied-Signal Inc. ("Allied-Signal"), a Delaware corporation, through its subsidiaries operates or formally operated each of the facilities listed in Appendix A (hereinafter collectively called the "Allied-Signal facilities"). Appendix A is attached and incorporated by reference as an integral part of this Administrative Consent Order. Allied-Signal has informed NJDEP that the Standard Industrial Classification ("SIC") numbers which best describes the operations for the Allied-Signal facilities are SIC numbers covered by ECRA. Allied-Signal has further informed NJDEP that hazardous substances as defined by the Regulations are used in operations at the Allied-Signal facilities. The Allied-Signal facilities are Industrial Establishments as defined by ECRA.

6. Allied-Signal was formed in 1985 through a combination of the Allied Corporation ("Allied"), a New York corporation, and The Signal Companies, Inc. ("Signal"), a Delaware corporation ("Combination"). On September 18, 1985 the share holders of Allied and Signal approved the Combination which required among other things the transfer of all voting shares of Allied and Signal to Allied-Signal in return for shares of Allied-Signal on a share-for-share basis. It was contemplated that the transfer of such shares would be completed by December 31, 1985; as of that date, approximately 90 percent of the voting shares of Allied and Signal had been exchanged for voting shares of Allied-Signal. NJDEP has informed Allied-Signal that the Combination as it relates to the Allied-Signal facilities is subject to ECRA and the Regulations.

7. Since December 31, 1985, Allied-Signal caused The Henley Group, Inc. ("Henley"), a Delaware corporation, to be formed. On or about May 27, 1986, Allied-Signal spun off Henley to Allied-Signal's shareholders ("the Spin-Off"). When the Spin-Off was completed, Allied-Signal shareholders owned sufficient stock of Henley to give them a majority of the voting power. NJDEP has determined that the Allied-Signal facilities involved in the Spin-Off are further subject to ECRA and the Regulations as a result of the Spin-Off.

8. In appropriate cases, NJDEP may allow transactions subject to ECRA to proceed by execution of an Administrative Consent Order. The Administrative Consent Order specifies a time schedule for completion of ECRA requirements by Allied-Signal and provides for financial assurances in forms and amounts acceptable to NJDEP. Failure to fully comply with all the terms and conditions of the Administrative Consent Order shall subject the Ordered Party(ies) to the full range of penalties and remedies prescribed in the Act, the Regulations, and the Administrative Consent Order.

9. NJDEP and Allied-Signal have agreed that an Administrative Consent Order shall be executed to ensure full compliance with ECRA and the Regulations.

10. On January 22, 1986, Allied-Signal entered into an agreement in principle with Ausimont U.S.A., Inc. ("Compo"), a Delaware corporation and a subsidiary of Ausimont-Compo/N.V., N.B., a Netherlands corporation, to sell an

ATTACHMENT C-2

Allied-Signal facility, identified in Appendix A as the Halon facility, to Compo ("Halon Sale"). NJDEP and Allied-Signal expressly agree that the Halon Sale is subject to ECRA.

11. On January 24, 1986, Allied-Signal entered into an agreement with Automotive Rentals, Inc. (ARI), a New Jersey corporation, to sell an Allied-Signal facility, identified in Appendix A as the Criswell facility, to ARI ("Criswell Sale"). NJDEP and Allied-Signal expressly agree that the Criswell Sale is subject to ECRA.

12. Allied-Signal has Informed NJDEP that the Halon Sale was consummated on or about June 17, 1986. In addition, the Criswell Sale is expected to be consummated in July, 1986. Allied-Signal has Informed NJDEP that it was unable to comply with all the requirements of ECRA and the Regulations by June 17, 1986 in connection with the Halon Sale and that Allied-Signal cannot comply with all of the requirements of ECRA and the Regulations by July, 1986 in connection with the Criswell Sale. Therefore, Allied-Signal has requested that this Administrative Consent Order prepared by NJDEP, also allow the Halon Sale and the Criswell Sale to be consummated prior to completion of all administrative requirements under ECRA and the Regulations.

13. UOP Inc. ("UOP"), an Indirect wholly-owned subsidiary of Allied-Signal, owns and operated a manufacturing facility at Route 17, East Rutherford, Bergen County; said site being further known as Block 104, Lots 4B, C, 5, 5A, 6 and 7 and Block 105A, Lot 11B on the tax map of the Borough of East Rutherford ("UOP facility"). UOP has informed NJDEP that the SIC number which best described the operations at UOP facility is 2819. UOP has further informed NJDEP that hazardous substances as defined by the Regulations are stored at the UOP facility. The UOP facility is an Industrial Establishment as defined by ECRA. NJDEP has determined that the UOP facility is subject to ECRA.

14. The UOP facility is presently the subject of an Amended Administrative Consent Order ("Amended ACO"), dated May 29, 1986, with NJDEP to ensure the cleanup of the UOP facility. NJDEP has determined that a completed cleanup at the UOP facility under the Amended ACO shall be deemed compliance with ECRA and the Regulations. Therefore, NJDEP and Allied-Signal have expressly agreed that the UOP facility shall not be additionally described within this Administrative Consent Order.

ORDER

NOW, THEREFORE, IT IS ORDERED AND AGREED THAT:

15. NJDEP and Allied-Signal expressly agree that the terms and conditions of this Administrative Consent Order, Including the financial assurance requirements, set forth In Paragraphs 16, 17 and 18 below, shall apply separately to each facility of the Allied-Signal facilities. Furthermore, Allied-Signal agrees to complete all applicable ECRA program requirements, including exercise of the financial assurance requirements and any other remedial measures pursuant to the Administrative Consent Order and ECRA separately for each of the Allied-Signal facilities.

16. ECRA Program Requirements for the Allied-Signal Facilities

A. Allied-Signal shall complete Initial Notices for each of the Allied Signal facilities in accordance with the time schedule set forth in Appendix A.

B. Within one hundred-fifty (150) days from receipt of NJDEP's written approval of the Sampling Plan(s) prepared for any of the Allied-Signal facilities, pursuant to N.J.A.C. 7:1-3.7(d)14 and N.J.A.C. 7:1-3.9, Allied-Signal shall initiate, complete, and submit to NJDEP the results from any NJDEP-approved Sampling Plan(s) including, but not limited to, delineation of environmental contamination on-site, and any off-site environmental contamination resulting from discharges of hazardous wastes or substances on or from the Allied-Signal facility(ies) which is subject of the approved Sampling Plan(s). NJDEP and Allied-Signal recognize that additional sampling may be necessary during the various stages of the implementation of this Administrative Consent Order and ECRA, including during the implementation of a Cleanup Plan(s), at any of the Allied-Signal facilities to delineate fully the nature and extent of environmental contamination on-site, and any off-site environmental contamination resulting from discharges of hazardous substances or wastes on or from any Allied-Signal facility(ies). Therefore, Allied-Signal agrees to submit any additional sampling plans for NJDEP review and approval required by NJDEP in writing during the various stages of the implementation of this Administrative Consent Order and ECRA, including during the implementation of a Cleanup Plan(s), to further delineate the nature and extent of environmental contamination on or from any of the Allied-Signal facilities. NJDEP and Allied-Signal mutually agree that Allied-Signal shall submit any additional sampling plans, required to NJDEP for review and approval within thirty (30) days of the receipt of said written request. Within one hundred-twenty (120) days from receipt of NJDEP's written approval of any additional Sampling Plans(s), Allied-Signal shall initiate, complete and submit to NJDEP the results from any additional NJDEP-approved Sampling Plan(s) required pursuant to this paragraph.

C. NJDEP shall notify Allied-Signal in writing requiring Allied-Signal to submit either a Negative Declaration(s) or Cleanup Plan(s) when sampling results have satisified NJDEP's requirement to delineate fully the nature and extent of environmental contamination on or from any Allied-Signal facility(ies). Allied-Signal shall submit a Negative Declaration(s) or Cleanup Plan(s) within sixty (60) days from receipt of a written demand from NJDEP for a Negative Declaration(s) or Cleanup Plan(s). If a Cleanup Plan(s) is required, the Cleanup Plan(s) shall address remediation of any contamination identified on or from any Allied-Signal facility(ies). Any Negative Declaration(s) or Cleanup Plan(s) submitted shall conform to N.J.A.C. 7:1-3.

D. Should NJDEP determine that any submittal made under Paragraph 16 of this Administrative Consent Order is inadequate or incomplete, then NJDEP shall provide Allied-Signal with written notification of the deficiency(ies), and Allied-Signal shall revise and resubmit the required information within a reasonable period of time not to exceed thirty (30) days from receipt of such notification.

ATTACHMENT C-4

F. Allied-Signal shall implement any NJDEP approved Cleanup Plan(s) in accordance with the approved time schedule or defer implementation of all or part of the Cleanup Plan subject to NJDEP approval pursuant to N.J.A.C. 7:1-3.14.

F. All submissions requred pursuant to Paragraph 16 or any other provision of this Administrative Consent Order shall be accompanied by all appropriate fees required pursuant to the Fee Schedule for ECRA, N.J.A.C. 7:1-4.

17. Financial Assurance

A. Allied-Signal shall obtain and provide to NJDEP separate financial assurances in the form of surety bonds or letters of credit for each of the Allied-Signal facilities in the amounts specified in Appendix A. These financial assurances shall be provided to NJDEP within seven (7) business days from the effective date of this Administrative Consent Order. The financial assurance must conform with the requirements of N.J.S.A. 13:1K-9(b)3, N.J.A.C. 7:1-3.10, N.J.A.C. 7:1-3.13, and this Administrative Consent Order.

B. Allied-Signal shall establish and submit to NJDEP for each of the Allied-Signal facilities separate standby trust funds within seven (7) business days from the effective date of this Administrative Consent Order. The financial institution(s) which issues the financial assurance(s) shall agree to promptly and directly deposit all amounts up to the total value of the financial assurance(s) into the standby trust fund(s) upon demand by NJDEP.

C. Upon NJDEP approval of a Cleanup Plan(s) for any Allied-Signal facility(ies), Allied-Signal shall amend the amount of the financial assurance(s), described in Appendix A for the Allied-Signal facility, or facilities as the case may be, to equal the estimated cost of implementation of the approved Cleanup Plan(s), or shall provide such other financial assurance(s) as may be approved by NJDEP in an amount(s) equal to the estimated cost of implementation of the approved Cleanup Plan(s).

D. in the event that NJDEP determines that Allied-Signal has failed to perform any of its obligations under this Administrative Consent Order or ECRA at any of the Allied-Signal facilities, NJDEP may draw on the financial assurance(s) for that Allied-Signal facility (ies) provided, however, that before any such demand is made, NJDEP shall notify Allied Signal in writing of the obligation(s) with which it has not complied, and Allied-Signal shall have reasonable time, not to exceed fourteen (14) calendar days, to perform such obligation(s) to NJDEP's satisfaction. Nothing in this paragraph shall prevent NJDEP from collecting stipulated penalties pursuant to the terms of this Administrative Consent Order for cause; however, such stipulated penalties shall not be drawn from said financial assurances.

E. Upon NJDEP's written approval of a Negative Declaration(s), Allied Signal shall be relieved of any further obligation to maintain in full force and effect the financial assurance(s) required by this Administrative Consent Order for the Allied-Signal facility(ies) which

ATTACHMENT C-5

is the subject of the NJDEP-approved Negative Declaration(s). Upon NJDEP's written approval of the completion of any cleanup(s) required by this Administrative Consent Order, as verified by final site inspection(s) pursuant to N.J.A.C. 7:1-3.12(e) and upon Allied-Signal's satisfaction of all financial obligations in connection therewith, Allied-Signal shall be relieved of any further obligation to maintain in full force and effect the financial assurance(s) required by this Administrative Consent Order for the Allied-Signal facility(ies) at which the approved cleanup(s) has been completed. Upon NJDEP's written approval of any Negative Declaration or completion of any Cleanup Plan, Allied-Signal shall be relieved of its obligations hereunder and compliance with this Administrative Consent Order will be deemed fulfilled as to the Allied-Signal facility to which the approval or completion applies.

F. Notwithstanding anything to the contrary set forth above, NJDEP agrees that it will entertain Allied-Signal's written request for the use of alternate self-bonding measures which may be used in lieu of the financial assurance provided pursuant to Paragraph 17.A. of this Administrative Consent Order.

18. Additional Conditions of Consent

A. Allied-Signal shall allow NJDEP access to each of the Allied-Signal facilities for the purpose of undertaking all necessary monitoring and environmental cleanup activities. Prior to entry into this Administrative Consent Order, Allied-Signal shall provide NJDEP with appropriate documentation that Compo, ARI and Henley shall allow the NJDEP access required herein.

B. Compliance with the terms of this Administrative Consent Order shall not excuse Allied-Signal from obtaining and complying with any applicable federal and state permits, statutes, regulations and/or orders while carrying out the obligations imposed by ECRA through this Administrative Consent Order. The execution of this Administrative Consent Order shall not excuse Allied-Signal from compliance with all other applicable environmental permits, statutes, regulations and/or orders and shall not preclude NJDEP from requiring that Allied-Signal obtain and comply with any permits, and/or orders issued by NJDEP under the authority of the Water Pollution Control Act, N.J.S.A. 58:10A-1 _et seq._, the Solid Waste Management Act, N.J.S.A. 13:1E-1 _et seq._, and the Spill Compensation and Control Act ("Spill Act") N.J.S.A. 58:10-23.11 _et seq._, for the matters covered herein. The terms and conditions of any such permit shall not be pre-empted by the terms and conditions of this Administrative Consent Order if the terms and conditions of any such permit are more stringent than the terms and conditions of this Administrative Consent Order. Should any of the measures to be taken by Allied-Signal during the remediation of any ground water and surface water pollution result in a new or modified discharge as defined in the NJPDES regulations, N.J.A.C. 7:14A-1 _et seq._, then Allied-Signal shall obtain a NJPDES permit or permit modification from NJDEP prior to commencement of said activity. Failure to comply with such other permits, statutes, regulations and orders, shall not be deemed a violation of this Administrative Consent Order. Notwithstanding the

ATTACHMENT C

foregoing, the NJDEP and Allied-Signal acknowledge that the Allied-Signal facilities subject to this Administrative Consent Order may also be subject to 42 U.S.C.A. 6924(u), 6924(v) or 6928(h) and to any similar provisions of the New Jersey Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq., or other New Jersey statute (hereinafter collectively referred to as "Corrective Action Provisions"). If New Jersey has not enacted applicable state Corrective Action Provisions or has not been duly delegated authorization by USEPA to administer the Federal Corrective Action Provisions, and if Allied-Signal is complying or has complied with the terms of this ACO as determined by NJDEP, NJDEP agrees to cooperate with Allied-Signal in discussions with the United States Environmental Protection Agency ("USEPA") officials by communicating to USEPA, in a manner deemed appropriate by NJDEP, the nature and extent of any NJDEP approved ECRA Cleanup Plan and the status of any performance under such ACO as known by NJDEP for any of the Allied-Signal facilities subject to the terms of this ACO. NJDEP agrees in principle with Allied-Signal that any NJDEP approved Cleanup Plan pursuant to ECRA should adequately address all environmental remediation required under the Corrective Action Provisions.

C. NJDEP agrees that it will not bring any action, nor will it recommend that the Attorney General's Office bring any action for failure to comply with (a) the time requirements in N.J.S.A. 13:1K-9(b)1 that NJDEP be notified within five (5) days of execution of an agreement of sale and (b) the time requirement in N.J.S.A. 13:1K-9(b)2 that a Negative Declaration or Cleanup Plan be submitted sixty (60) days prior to transfer of title. NJDEP also agrees that it will not bring any action, nor will it recommend that the Attorney General bring any action seeking monetary penalties for Allied-Signal's failure to meet the time requirements specified in (a) and (b) of this paragraph.

D. No obligations imposed by this Administrative Consent Order (other than by paragraph "18F" below) are intended to constitute a debt, claim, penalty or other civil action which could be limited or discharged in a bankruptcy proceeding. All obligations imposed by this Administrative Consent Order shall constitute continuing regulatory obligations imposed pursuant to the police power of the State of New Jersey, intended to protect the public health, safety and welfare.

E. This Administrative Consent Order imposes certain requirements and deadlines upon Allied-Signal. Allied-Signal agrees to use its best efforts to comply with said requirements and NJDEP agrees not to act unreasonably in the enforcement and implementation of this Administrative Consent Order.

F. In the event that Allied-Signal fails to comply with any of the provisions of this Administrative Consent Order, Allied-Signal shall pay to NJDEP stipulated penalties in the amount of up to $5,000.00 at discretion of NJDEP for each day for each Allied-Signal facility for which Allied-Signal fails to comply with any obligation under this Administrative Consent Order provided, however, that no such stipulated penalty shall be payable by Allied-Signal with respect to such period that said failure to comply results from Force Majeure. Allied-Signal waives its rights to contest NJDEP's exercise of discretion concerning the amount of any penalty assessed by NJDEP pursuant to this paragraph.

ATTACHMENT C7

G. The provisions of this Administrative Consent Order shall be binding upon Allied-Signal and its successors in interest, assigns, tenants, and any trustee in bankruptcy or receiver appointed pursuant to a proceeding in law or equity, and pursuant to ECRA, specifically N.J.S.A. 13:1K-13, and the Regulations, upon its officers and management officials.

H. NJDEP waives its right to void the transfer of stock. Allied-Signal's failure to submit an approvable Negative Declaration(s) or Cleanup Plan(s) for any or all of the Allied-Signal facilities, as the case may be, shall constitute grounds pursuant to the terms and conditions of this Administrative Consent Order for the NJDEP to void the Combination, Spin-Off, Halon sale or Criswell sale, as the case may be. NJDEP's right to void the Combination, Spin-Off, Halon sale or Criswell sale, as the case may be, shall terminate upon NJDEP's written approval of an appropriate Negative Declaration(s) or Cleanup Plan(s) for any or all of the Allied-Signal facilities as the case may be, submitted by Allied-Signal pursuant to this Administrative Consent Order and ECRA.

I. Any submission to be made to NJDEP in accordance with this Administrative Consent Order shall be directed to:

Lance R. Miller, Chief
Bureau of Industrial Site Evaluation
Division of Waste Management
428 East State Street
Trenton, NJ 08608

J. Upon completion by Allied-Signal of all requirements under the terms of this Administrative Consent Order as determined by NJDEP, such Administrative Consent Order shall terminate.

19. Force Majeure

If any event occurs which purportedly causes or may cause delays in the achievement of any deadline or completion of any obligation contained in this Administrative Consent Order, Allied-Signal shall notify NJDEP in writing within ten (10) days of the delay or anticipated delay, as appropriate, referencing this paragraph and describing the anticipated length, precise cause or causes, measures taken or to be taken and the time required to minimize the delay. Allied-Signal shall adopt all necessary measures to prevent or minimize any delay. If any delay or anticipated delay had been or will be caused by fire, flood, storm, riot, strike or other circumstances determined by NJDEP to be beyond the control of Allied Signal, then the time for performance hereunder shall be extended by NJDEP for a period no longer than the delay resulting from such circumstances, provided that NJDEP may grant additional extensions for good cause. If the events causing such delay are not found by NJDEP to be beyond the control of Allied-Signal, failure to comply with the provisions of the Administrative Consent Order shall constitute a breach of the Administrative Consent Order's requirements. The burden of proving that any delay is caused by circumstances beyond Allied-Signal's control and the length of such delay attributable to those circumstances shall rest with Allied-Signal.

Increases in the costs or expenses incurred in fulfilling the requirements contained herein shall not be a basis for an extension of time. Similarly, delay in completing an interim requirement shall not automatically justify or excuse delay in the attainment of subsequent requirements.

20. Reservation of Rights

This Administrative Consent Order shall be fully enforceable in the New Jersey Superior Court having jurisdiction over the subject matter and signatory parties upon the filing of a summary action for compliance pursuant to ECRA. This Administrative Consent Order may be enforced in the same manner as an Administrative Order issued by NJDEP pursuant to other statutory authority and shall not preclude NJDEP from taking whatever action it deems appropriate to enforce the environmental protection laws of the State of New Jersey in any manner not inconsistent with the terms of this Administrative Consent Order. It is expressly recognized by NJDEP and Allied-Signal that nothing in this Administrative Consent Order shall be construed as a waiver by NJDEP of its rights with respect to enforcement of ECRA on bases other than those set forth in the ECRA Program Requirements section of this Administrative Consent Order or by Allied-Signal of its right to seek judicial or administrative review of any enforcement action as provided by the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq. Furthermore, nothing in this Administrative Consent Order shall constitute a waiver of any statutory right of NJDEP to require Allied-Signal to implement additional remedial measures should NJDEP determine that such measures are necessary to protect the public health, safety and welfare.

21. Allied-Signal hereby consents to entry of this Administrative Consent Order and waives its right to a hearing concerning the terms hereof pursuant to N.J.S.A. 52:14B-1 et seq.

22. NJDEP and Allied-Signal have entered into this Administrative Consent Order to insure ECRA compliance and to allow the Merger and all transactions ancillary thereto be completed as quickly as possible. Allied-Signal has executed this Administrative Consent Order without trial or adjudication of any issue of fact or law. Accordingly, neither Allied-Signal's execution of this Administrative Consent Order, nor its compliance with any of the provisions hereof, shall be deemed or construed to be an admission of liability at any time or for any purpose other than Allied-Signal's responsibility to comply with the terms and conditions of the Administrative Consent Order, ECRA and the Regulations.

ATTACHMENT C9

23. This Administrative Consent Order shall take effect upon the signature of all parties. Upon the signature of all parties, Allied-Signal may complete the Criswell Sale subject to the Administrative Consent Order.

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Date: July 31, 86

By: Ronald T. Corcory
Ronald Corcory, Assistant Director for Enforcement & Field Operations

ALLIED-SIGNAL INC.

Date: July 28, 1986

By: Edward L. Hennessy
Name: Edward L. Hennessy, Jr.
Title: Chairman of the Board and Chief Executive Officer

ATTACHMENT C

ATTACHMENT D

Allied-Signal Aerospace Company

AlliedSignal

Radiological Remediation Report

for the

Allied-Signal Aerospace Teterboro Facility Teterboro, New Jersey

Prepared by

EBASCO ENVIRONMENTAL
A Division of Ebasco Services Incorporated

June 1991

ATTACHMENT D

ALLIED-SIGNAL AEROSPACE COMPANY
TETERBORO FACILITY
RADIOLOGICAL REMEDIATION REPORT

CONTENTS

ATTACHMENT D2

LIST OF TABLES

LIST OF FIGURES

ATTACHMENT D3

1. Characterize the gamma radiation exposure rates on the Allied-Signal and surrounding properties, including inside Plants 1, 4 and 5.

2. Characterize the type, magnitude, and extent of radioactive material contained in soil throughout the Allied-Signal and surrounding properties.

3. Characterize the type, magnitude, and extent of radioactive material contained in sediment and surface water in the east and west drainage ditches, to determine if any radioactive material was leaving the site.

4. Determine areas that would require remediation.

The remainder of this section presents remediation activities, the regulatory basis for soil remediation and an overview of the site. The regulatory basis established the cleanup goals for the soils at the site. Section 2.0 outlines site history and the results of the radiological characterization of the site. Section 3.0 presents a summary of the activities that took place at the site in conjunction with the remediation. Section 4.0 presents the results of the confirmatory sampling program and conclusions based on those results. Section 5.0 summarizes the conclusions and resulting recommendation. Appendix A contains a glossary; Appendix B describes the instmment calibration and soil sample screening processes; and Appendix C contains the analytical laboratory results.

1.1 RADIOLOGICAL REMEDIATION

As a result of the radiological characterization of the Allied-Signal facility, areas requiring remediation were identified. Remedial activities included the excavation of contaminated soll, the preparation of the excavated soil for transport to a disposal site, and the backfilling of the excavated areas.

ATTACHMENT D4

Soil sampling and direct reading exposure rate meters were used to determine the extent of excavation required and to certify that the remaining soil meets clean-up goals. A gamma-ray scintillation counting system was set up at the site during radiological characterization activities (the radiological field screening laboratory). This system was used during remediation to assist in the evaluation of the success of the remedial activities. Final confirmatory samples were sent to an analytical laboratory for analysis.

1.2 REGULATORY BASIS

The Department of Energy (DOE) developed guidelines for soil concentration limits for the Formerly Utilized Site Remedial Action Program (FUSRAP). These guidelines serve as the cleanup goals for the site. The guidelines state that the concentration of radionuclides is limited to 5 pCi per gram of soil in the first 15 cm (6 inches) of soil and 15 pCi per gram in subsequent 15-cm layers of soil. These guidelines are based on U.S. Environmental Protection Agency (EPA) standards for uranium mill tailings, 40 CFR Part 192. These guidelines are concerned with radium-226, radium-228, thorium-228, thorium-230 and thorium-232. Radium-226 and thorium-232 are of concern at this site.

When a mixture of any of the four radionuclides is encountered, the mixture sum must be less than unity. The mixture sum is the sum of the concentration of the radionuclides in the mixture, less background, divided by the concentration limit. In other words,

For soil depth of 0-15 cm (0-6 inches):

$$\frac{NC_{\text{Ra-226}} + NC_{\text{Ra-228}} + NC_{\text{Th-228}} + NC_{\text{Th-230}} + NC_{\text{Th-232}}}{5\ \text{pCi/gram}} \leq 1$$

For soil depths greater than 15 cm (6 inches), in 15 cm intervals:

$$\frac{\overset{NC}{\text{Ra-226}} + \overset{NC}{\text{Ra-228}} + \overset{NC}{\text{Th-228}} + \overset{NC}{\text{Th-230}} + \overset{NC}{\text{Th-232}}}{15\ \text{pCi/gram}} \leq 1$$

NC is the net concentration (measured concentration minus background), in pCi/gram, for each radionuclide. The concentrations can be averaged over an area of 100 square meters.

1.3 OVERVIEW OF SFTE

The Allied-Signal Aerospace Company Site is located in Teterboro, New Jersey. The facilities were previously owned by Bendix Company. In December 1982, Allied acquired Bendix and the facility became known as Allied/Bendix, and finally, Allied-Signal. The site is located in an industrial area adjacent to Teterboro Airport. Adjoining the Allied property are properties owned by Metpath, Inc. and Sumitomo Machinery Corporation, properties previously owned by Bendix. The investigation presented here is concemed with the Allied and Metpath properties.

As noted in Section 1.2, the soil contamination guidelines are based on levels excluding background. Table 1-1 presents typical background soil concentrations for the radionuclides of concem.

Physiographically, the Teterboro area is characterized by low-lying, flat topography dotninated by tidal marshlands at an elevation less than ten feet above mean sea level. This setting is the result of the stagnation and recession of the last stage of continental glaciation. In this area of New Jersey, large glacial lakes were formed by the damming of streams by glacial ice. Following the retreat of the ice sheet and draining of these lakes, the flat-lying, fine-grained lake bed sediments were exposed to both marine and fluvial action. The net result of these processes was the creation of horlzontally-extensive deposits of laminated fine silts and clays, overlain by fine to coarse silty sands. The subsequent establishment of marsh vegetation created an organic layer of decaying roots and other plant remains, which now blankets the underlying sediments.

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TABLE 1-1

BACKGROUND RADIATION LEVELS IN THE NORTHERN NEW JERSEY AREA

Type of radiation measurement or sample	Radiation level or radionuclide concentration
Gamma exposure rate at 1 meter above ground surface (uR/h)	8
Concentration of radionuclides in soil (pCi/gram)	
Th-232	.58-1.1
U-238	<2.3-6.4a
Ra-226	.42-.87

Source: Cole et al., 1981. Radiological Assessment of Ballod and Associates Property (Stepan Chemical Company), Maywood, New Jersey, Oak Ridge Associated Universities, Oak Ridge, TN.

a <2.3 indicates a reading below a detection limit of 2.3 pCi/gram

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Prior drilling programs conducted at the Bendix plant confirmed the existence of this general stratigraphy. Most borings retrieved a rich black organic soil horizon overlying approximately 4 to 7 feet of silty, fine to medium gray sand. These sands are in tum underlain by a uniform and horizontally extensive, dense, laminated (varved) clay interbedded with very thin silt lenses. In the study area, these clays can exceed 160 feet in thickness. The varved clay forms a substantial confining layer, thus limiting the shallow water table at the plant site to be overlying silty sands.

The water table is fomd at very shallow depth (i.e. 2 to 5 feet) across the site. Much of the site has been backfilled with clean, uncontaminated material to bring average grade elevations to 5 to 7 feet above sea level. Groundwater flow is estimated to be locally towards the boundary drainage chamels found on the east and west sides of the plant. On a regional scale, the direction of flow in the unconsolidated deposits is estimated to be east and southeast towards the Hackensack River.

The climate and meteorological conditions at the site have been characterized using information from Newark Intemational Airport, which is approximately nine miles southeast of the site. The airport is in a setting similar to the site and therefore is considered to be representative of the site.

Climate in the site area includes moist, warm summers and moderately cold winters. Wind rose diagrams indicate that winds in the area blow predominantly from the southwest with small seasonal variations in direction. Precipitation is fairly mifom throughout the year, and annual average precipitation is approximately 42 inches; seasonal tropical storms and hurricanes do occur. The average amual potential evaporation of 35 inches results in a net annual precipitation of approximately 7 inches which, in theory, is the net amount of water available for groundwater recharge and surface runoff.

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2.0 SITE HISTORY

This section presents an overview of past site activities and previous site investigations. The site activities listed below are those activities related to the use of radioactive material at the site. The previous site investigations are limited to the most recent radiological characterization.

2.1 PAST SITE ACTIVITIES

Bendix acquired the 101-acre Teterboro property in 1937. This original Bendix property is now approximately bounded on the east by Industrial Avenue, on the north by Route 46, on the west by Route 17, and on the south by Malcolm Avenue.

When purchased, the land, formerly marsh and partially developed swampland, required considerable work and 3-4 feet of fill to develop the land properly for constmction of buildings and amenities.

In 1941, Bendix sold a large portion of this property to the Navy, which in mm commissioned Bendix to build and operate under contract a foundry for the production of magnesium and aluminum castings. The Navy site included, in addition to the foundries, a sanitary sewage treatment facility with sand beds and a small document incinerator. In 1955, an additional 40,000 square feet was added to the magnesium foundry to consolidate foundry operations into one location. The Navy terminated its use of the foundry in 1961.

Bendix repurchased the property from the Navy in 1961 and continued limited operations of the foundry until 1968. In 1968, the foundry building was closed and cleaned out. The buildings were converted for use as office space in 1969.

In 1977, Bendix sold approximately 22 acres of its land south of the foundry, adjacent to Malcolm Avenue, to Metpath and Sumitomo. In September, 1980, Bendix conveyed a second parcel of land, 8.7 acres, to Metpath. The southwest comer of the Bendix properties, consisting

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of 7.5 acres, which had been purchased by Sumitomo, contained the former Naval sewage facility, sand beds and a small document incinerator. Representatives of Sumitomo stated that the only stmctures on this property, at the time of purchase, were a concrete sewage tank and some small concrete structures that may have been supports or foundations.

Representatives of Bendix stated that prior to 1958 only limited available thorium-magnesium alloy technology existed. This precluded use of thorium at the foundry until 1958, at which time, AEC licenses were issued to the Bendix Corporation in Teterboro, New Jersey during the period 1958 to 1973 for possession of up to 10,000 pounds of 40% thorium-magnesium hardener for production of up to 4% thorium-magnesium alloy castings.

2.2 PAST INVESTIGATIONS

The Department of Energy (DOE) under FUSRAP is conducting a project to decontaminate the former Maywood Chemical Company site in Maywood, New Jersey, and associated vicinity properties. This project included surveys that had been conducted by DOE in order to identify these associated vicinity properties. As a result of a wide-area scan (mobile gamma scan) conducted on the Allied-Signal facility, some radiation anomalies were identified on the property and the two neighboring properties owned by Sumitomo and Metpath. Additional radiological surveys were conducted between November 1986 and January 1988 to identify the source of these anomalies and to determine if they were connected with the former Maywood Chemical Company operations.

The residual radioactivity identified on the Allied-Signal and adjoining properties by the survey was primarily due to elevated levels of thorium and radium and their associated decay products in the soil. The infonnation collected as a result of the DOE activities indicates at this time that the residual radioactive material was not derived from the Maywood Chemical Company site.

The results of the DOE survey triggered fiirther investigations that culminated in the remediation of the site. The results of this investigation are presented below.

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2.2.1 Outdoor Gamma Radiation Survey

An outdoor gamma radiation survey was conducted to identify potentially contaminated soil areas. The highest exposure rate found on the Allied-Signal property was approximately 200 uR/hr at ground level in front of the Hazardous Waste Storage Building. The elevated areas on the Allied property fell into two categories. The elevated areas near the south of the property were fairly uniform over a definite area. Other areas were hot spots (high exposure rates over very small areas). Areas adjacent to buildings were not considered. Building material contains high concentrations of natural radioactive material, resulting in elevated exposure rate measurements. The highest exposure rate on the Metpath Inc. property was 12 uR/hr. The elevated areas on the Metpath property were fairly uniform over asphalted surfaces.

2.2.2 Soil Sampling

Table 2-1 presents the laboratory analysis results for samples greater than the DOE soil guidelines. The table contains the sample number, the number of counts per five minutes determined during screening, the gamma-log results, and the analytical laboratory results. The correlation between screening values and levels of contamination is presented in Appendix B. This appendix should be reviewed for a complete understanding of sample screening.

Background concentrations of Ra-226 and Th-232, 0.77 pCi/gram and 0.85 pCi/gram were subtracted from the laboratory results to arrive at the results in Table 2-1. Four boreholes contained samples with levels greater than the soil guidelines. These samples were SL-28-01, SL-65-05, SL-65-09, SL-79-02, SL-79-03, SL-79-04, SL-96-01, SL-96-02, SL-96-03, and SL-96-04.

Samples SL-34-04 and SL-34-07 had soil concentrations of Ra-226, after correction for background and wet versus dry weight, slightly below the 15 pCi/gram guideline. This borehole (SL-34) was adjacent to boreholes SL-96 and SL-38 and remediation plans for these two boreholes included borehole SL-34.

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TABLE 2-1

SOIL SAMPLING RESULTS

SAMPLES GREATER THAN SOIL GUIDELINES

Sample	Screening (Counts/5 min)	Gamma-Logging (uR/hr)	Net Radionuclide Concentration, pCi/gram* Ra-226	Th-232
SL-28-01	2,680	2.00	5.7	<0.5
SL-65-05	100,000	515	830	<3
SL-65-09	9,440	NA**	76	<1
SL-79-03	18,100	NA	95	0.85
SL-79-04	17,100	NA	79	<1
SL-96-01	46,800	NA	300	<2
SL-96-02	60,300	NA	340	<2
SL-96-03	60,000	NA	230	<2
SL-96-04	27,600	NA	160	<1

*Net concentration equals screening results less background (0.77 pCi/gram for Ra-226 and 0.85 pCi/gram for Th-232).

**Not available.

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Appendix B contains the presentation of the relationship between soil screening results and Ra-226 and Th-232 concentrations in soil. The appendix containing details on the screening procedure and the calculations that support the development of the calibration curves for Ra-226 and Th-232. These curves were used to relate net screening counts to concentrations in soil. From these relationships, the screening level corresponding to concentrations of concem (5 pCi/gram and 15 pCi/gram) were determined. The results showed that 2410 counts per 5 minutes and 3340 counts per 5 minutes corresponded to 5 pCi/gram for Ra-226 and Th-232, respectively. A concentration of 15 pCi/gram corresponded to 4000 counts per 5 minutes for Ra-226 and 6790 counts per 5 minutes for Th-232. The two critical values for Ra-226 (2410 counts per 5 minutes and 4000 counts per 5 minutes) were used, since they are the limiting values.

The critical values were applied to samples taken at the site, screened, but not sent to the laboratory. The screening results for samples not analyzed in the laboratory were reviewed. Any sample with the sample number "01" that has a screening value greater than 2410 counts per 5 minutes potentially exceeded the 5 pCi/gram target value. Similarly, any other samples with screening values greater than 4000 counts per 5 minutes potentially exceeded the 15 pCi/gram level. All of those samples exceeding the critical values were sent to the lab. From this, it was concluded that the samples not analyzed at the laboratory were below the appropriate target level. Appendix B should be consulted for the derivation of the correlation between screening results and soil concentrations of Ra-226 and Th-232.

The areas corresponding to SL-65, SL-79, and SL-96 and SL-38 had soil concentrations that greatly exceed the 5 and 15 pCi/gram target levels. These boreholes had maximum concentrations of Ra-226 of 830 pCi/gram, 95 pCi/gram, and 340 pCi/gram. It is probable that the average of these concentrations over 100 square meters, as suggested in the DOE guidelines, could have resulted in levels less than the target values (i.e., each of these boreholes represent hot spots). However, it was recommended that the hot spots (contaminated soil) be remediated. The rationale for this conclusion includes:

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- o Since only hot spots were encountered, the work that would be required to remove the material is minimal.

- o Since thorium-magnesium slag in the drums is to be disposed of at a licensed natural occurring radioactive material (NORM) disposal site, and since Ra-226 in soil above the guidelines is considered a NORM waste, the contaminated soil could be disposed of with the drum material.

- o The work that was required to demonstrate that the average concentration in the sod is below the target value was equal to or exceeded the work required to remove the material.

The area corresponding to SL-28 was re-evaluated during remediation. It was recommended that additional soil samples be collected and screened to more accurately estimate radionuclide content. Since the laboratory (and screening) results were close to the target level, a small resampling effort could eliminate this area from concem.

2.2.3 Sediment Sampling

Table 2-2 presents the results of the sediment sampling program. All results were at background levels, with the exception of Th-232 in sediment sample WD-02. After subtracting background, WD-02 had a Th-232 concentration of 6 pCi/gram. WD-02 was located near the dmms of thorium-magnesium slag located on the Metpath property. Background levels are represented by samples WD-01 and ED-01, the upstream samples.

The sediment sample that exceeded the soil guidelines, WD-02, was taken near the bank where drums containing thorium-magnesium slag were stored. Additional analysis of the sediment in this area was required to characterize the extent of the contamination in this area. Areas found to be above levels of concem could be removed and disposed of along with the drum material on the creek bank. It was therefore recommended that the additional sampling and remediation be part of the West Bank remediation, i.e., the remediation of the drums containing

TABLE 2-2

SEDIMENT SAMPLING

RADIONUCLIDE CONCENTRATIONS

Sample	U-238	Ra-226	Th-232	K-40
	Radionuclide Concentration, pCi/gram			
		Sediment		
WD-01	<4	0.5	1.2	15
WD-02	<5	1.5	7.2	12
WD-03	<2	0.8	0.7	12
WD-04	<6	1.3	1.1	25
WD-05	<4	0.9	1.0	19
EQ-01	<3	0.6	0.7	12
ED-01	<3	1.0	0.8	19
ED-02	<3	0.4	0.5	11
ED-03	<5	0.5	0.8	9

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thorium-magnesium slag. Section 4.0 presents the additional characterization conducted after the execution of the remedial activities.

2.2.4 Indoor Radiation Survev

An indoor radiation survey was conducted inside Plants 1, 4, and 5. The results of the survey showed an area of potential contamination in Plant 1, with readings of 9.64 and 12.4 uR/hr. All other areas were found to be at background levels or had levels attributable to specific industrial sources. These sources are listed below and were identified by moving the probe to locate peak levels.

- o Granite blocks used to stabilize small machinery.
- o Granite cutting stones stored in one location.
- o Masonry walls with elevated concentrations of natural radioactive material.

The results of the indoor radiation survey showed two areas of concem in Plant 1. These areas, in the DCASPRO production area, had elevated extemal exposure rates of 9.64 uR/hr and 12.4 uR/hr. An individual exposed to the 12.4 uR/hr rate for an entire working year (2000 hours) would receive a dose of 25 millirem (including background), or 0.5 percent of the occupational limit allowed by the Nuclear Regulatory Commission. It is not expected that these exposure rates would result in any adverse effects to workers. However, in order to assure that doses were kept as low as reasonably achievable, it was recommended that the source of these elevated levels be identified, and if "reasonably achievable", remediated. The results of this resurvey are discussed in Section 4.0.

2.2.5 Creek Bank

The eastem side of the creek bank along the west creek contained drums of Th-Mg slag. These drums were used as riprap along the bank. The radiological investigations of the facility did not include this area. The remediation of this area was planned from the beginning of site investigations and no sampling was needed. Soil and gamma-radiation sampling was performed in this area as part of the pre-excavation activities.

As an additional check, the western side of the creek bed was gamma surveyed after the remediation. The results are presented in Section 4.0.

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3.0 REMEDIAL ACTIVITIES

This section describes the activities associated with the remediation of the site. The activities included:

1. Site preparation activities prior to excavation
2. Excavation activities
3. Post-excavation activities

3.1 PRE-EXCAVATION ACTIVITIES

The field activities were initiated by delineating the proposed extent of each excavation. From the radiological characterization results, contaminated areas were located. An idealized extent of contamination was estimated radially outward from each hot spot located on paved areas and circles were spray painted on the ground. At the unpaved area, the location of drums and borderlines between contaminated and uncontaminated areas along the creek bank were flagged.

After the areas were marked, an exposure rate survey was conducted to confirm earlier readings. At the paved areas, this survey located the highest reading, which was the starting point of the excavation (usually the center of the circle or close to it). Excavation began at this point and worked radially outward. At the unpaved area, the survey confirmed the border between contaminated and uncontaminated areas. Excavation began on the acceptable side of the borderline and worked into the area of higher readings.

Eastern Remedial Environmental Services (ERES) was contracted to excavate the soils. ERES mobilized two backhoes (Caterpillar 215B and a Case 580), a heavy duty forklift, two tankers, an equipment trailer, and support vehicles to the site during the week of November 26, 1990. An unused parking lot, in the far southwest corner of the facility, was designated as the staging area. All equipment for the remediation was stored in the staging area. The staging area also served as the equipment decontamination and soil container storage areas.

A central location in the staging area was picked for the decontamination pad and the soil container storage area. This area was cleared of vegetation and graded. For the container area, sheets of plastic were double layered across the ground and slightly bermed at the edges. The decontamination pad had gravel laid out and formed into berms and a floor. A double layer of plastic was laid onto the floor and over the berms. Additional gravel was placed on top of the plastic within the berms, and was brought within a few inches of the top of the berms. Gravel was also used to form a ramp for equipment access on and off the pad. A sump was formed and used to collect decontamination water. The water was pumped from the pad sump to the first tanker, which was known as the settling tanker.

Equipment that came in contact with any excavated soil or contaminated water was decontaminated at the decontamination pad. Equipment was also decontaminated when it first came onto the site and finally left the site. At the pad, equipment was first scrubbed with alconox and potable water. After sufficient scrubbing, equipment was rinsed with potable water from a high pressure washer. Water generated from the pad was pumped to the settling tanker.

Sampling equipment such as stainless steel bowls, spoons, buckets and auger buckets were decontaminated in mbs at the staging area. Equipment was first scmbbed with alconox and potable water. Next it was rinsed with deionized water and ailowed to air dry. Once dry, equipment was wrapped in aluminum foil. Spent decontamination water was poured into the settling tanker.

Prior to excavation, the pavement over the contaminated soil was cut. Pavement was cut with a manually operated jackhammer running off a portable air compressor. The spray painted circles used to show the proposed extent of each excavation were traced with the jackhammer. Asphalt on site averaged three inches thick. The asphalt in front of the hazardous waste building (SL-79) was found to be underlain by concrete. The concrete was found to be nine inches thick and reinforced with rebar.

Pre-excavation sampling was conducted along the east bank of the creek in areas thought to mark the border between contaminated and uncontaminated soils. This sampling was used to further define this borderline and helped to insure that the excavating would start on the clean side of this borderline.

Soil sampling was performed throughout the remediation to establish soil contamination levels in excavation areas. The samples, in conjunction with exposure rate survey data, helped to determine whether the remaining soil had concentrations below the clean-up goal. Soil sampling was conducted in the foilowing manner:

1. In a given area of the excavation, the exposure rate at the soil surface was taken. The location with the highest exposure rate was selected as the sampling location. The location was recorded in the field book.

2. Properly decontaminated sampling equipment such as stainless steel bowls, spoons, and hand augers were mobilized to the sampling location.

3. Depending on the location of the soil to be sampled, either a hand auger or a spoon was used to coilect the soil to be sampled.

4. Soil was then be placed in a bowl and homogenized with a spoon.

5. After sufficient homogenization, soil was transferred to proper sample containers.

6. The lid of each container was marked with the sample number, the depth (from the original grade) where taken and the time.

7. Samples were brought back to Ebasco's field radiation laboratory trailer and screened (See Appendix B).

8. All sampling information was recorded in a fieldbook. Ail screening information was recorded in a sample log book.

9. Depending on screening results, samples were either sent to the laboratory or stored awaiting disposal.

10. Sampling equipment was decontaminated as described above.

3.2 SOIL EXCAVATION

Once the projected boundaries of the excavations were set, excavation began along the creek bank. The larger backhoe, the Caterpiilar 215B, started at the "clean" side and moved toward the contaminated soil areas. Excavation continued until ail visible contamination and dmms were removed and the borderline at the other end of the excavation was reached. After the first mn through (i.e., after ihe entire length of the bank was excavated), the length of the excavation was gamma surveyed by the exposure rate meter. The gamma probe itself was attached to two 5-ft hand auger extensions and lowered into the excavation. This negated the need for personnel to enter the excavation. Soil samples were taken at five foot intervals alternating between wail and floor samples, throughout the entire excavation. Sanples were taken and screened. After reviewing results from sample screening, further excavating began in areas that were identified as still having unacceptable readings. Soil that was removed from below the water table had to be dewatered. Dewatering was accomplished by placing the soil on double layer plastic, covering the soil with plastic and ailowing the soil to sit for 24 hours. Ail soil was containerized as described below. Water encountered within the excavation was dewatered as described below. The excavating, exposure rate surveying, and sampling continued until soil radiation levels within the excavation were acceptable. Once this was reached backfilling began. (See Section 3.3).

The paved areas were handled in a slightly different manner. The Case 580 backhoe was used for these excavations. Excavations were started at the center of the proposed excavation and continued radially outward. These excavations were shallow and exposure rate surveying could be accomplished safely in the excavation. The water table was not encountered, so there was no need for soil dewatering. Only a smail amount of rainwater was removed from paved area excavations. Samples were taken from both the floor and wails of each excavation and simated to cover a representative portion of the excavation. These excavations also foilowed the pattem of excavate, survey, and sample until acceptable levels were reached within an excavation. Again, soil sampling and dewatering activities were conducted as described above.

All soil removed from excavations was containerized for transport. The majority of the soil was loaded into 4 ft x 4 ft x 6 ft steel (B-25) boxes equipped with lids that could be fastened down. These boxes were moved around the site with the aid of a forklift. Each box was brought from the staging area to the excavation area. The box was placed on a sheet of plastic next to the excavation, within reach of the backhoe arm. Another sheet of plastic was placed inside the box and draped over the outside. This helped to keep soil from coming in contact with the outside of the box. Soil was loaded into the box until it was within several inches of the top. At this point, the plastic that was draped over the outside was folded into the box on top of the soil. The lid was then fastened in place with metal cilps. The box was spray painted with a number. This sequential number was recorded in the field book and was used to identify which box came from which excavation. The box was then brought back to the staging area and placed in the soil container storage area.

Near the end of the remediation phase, due to a shortage of B-25 boxes, 8 ft x 8 ft x 20 ft "Sealand" containers were used. These containers, with an opening at the end instead of on top, required the use of a "Bobcat" front loader to place the soil within it. Boxes were loaded onto flatbed tractor trailer trucks for proper disposal. The B-25 boxes were loaded with the forklift, while the Sealand containers were loaded with a 50-ton crane.

Dewatering occurred whenever water did or could come in contact with potentially contaminated solls. Dewatering was accomplished through the use of a 2-inch double diaphragm pump, capable of pumping 200 gallons per minute. The pump was air driven by a portable compressor. Fire hoses were used for both the intake and outtake lines of the pump. The intake line, with a cylindrical strainer at the end, was placed in the water within the excavation. The outtake line led into the top of the settling tanker. Water was pumped from the excavation to the settling tanker. When dewatering was complete, the water in the settling tankers was allowed to sit so suspended particles could settle out. After sufficient time for settling, the water in the first tanker was pumped through a sand pack type filter system into a second tanker, known as the holding tanker. Once the holding tanker was full, the water in it was sent for laboratory analysis. Upon receipt of laboratory results, indicating no elevated readings, the water was properly disposed of.

3.3 BACKFILLING AND DEMOBILIZATION

As each excavation was considered complete, and confirmatory sampling was finished, backfilling of the excavation began. At the initlation of backfilling, an indicator liner was laid across the bottom and sides of the excavation. This liner, made of a synthetic fiber, marked the three dimensional extent of the excavation. After the liner was in place, the actual backfilling would begin. Certified clean bankrun fill was laid down on top of the liner in one foot lifts. Manually operated, gas powered, soll compactors (jumping jacks) compacted the fill. Bankrun fill was brought to approximately six inches below grade. Approximately three inches of Quarry Process (QP) fill was placed on top of the banknm and compacted. Next, the existing asphalt edges of the excavatlon were squared off with pavement cutting saws. Last, a three inch layer of asphalt was placed on top of the QP to bring the excavation back to existing grade.

Demobllization of the staging area was completed in phases. Equipment decontamination was the first phase. The next phase involved the cleaning up of the decon pad and soll container storage area. After all soll boxes were loaded out the plastic sheeting was removed and disposed of. The decon pad was sprayed with high pressure water and pumped dry. A sample of the gravel from the center of the pad was taken and radioloigically screened. Results from the screening showed no elevated readings. Gravel and plastic were disposed of accordingly.

The tankers were addressed next. The holding tanker was sampled as mentioned previously and the water was found to be clean. After disposing of the water the tanker was checked and demobllized. The settling tanker contained a number of inches of sludge. A sample of this sediment was taken and found to be contaminated. The sludge was mixed with concrete to form a slurry. This slurry was then pumped into 55-gallon drums and allowed to solidify. Rinse water used to further clean the tanker was also mixed with concrete and drummed. Dmms were properly disposed of.

4.0 CONFIRMATORY SAMPLING PROGRAM

The confirmatory sampling program confirming successful remediation was conducted in two distinct phases. The first phase evaluated those areas deemed suspect in the original radiological characterization of the facility. The areas included the sediment adjacent to the contaminated bank of the west creek and SL-28. The second phase evaluated the success of the soil excavation operations. The results of this phase were used to confirm that the Th-232 and Ra-226 concentrations of the soil that remained were within the acceptable range.

4.1 PHASE 1: SUSPECT AREAS

The radiological characterization of the Allied-Signal Teterboro facility concluded that two areas should be resampled before a decision to remediate them was made. One area was the sediment in the creek adjacent to the contaminated bank. WD-02, taken during the original characterization, indicated Th-232 concentrations of 6 pCi/gram above background. WD-02 was located just north of the north-end of the sheet piling.

Eight sediment locations were sampled as part of the reevaluation. Samples were taken every 25 feet along the 150-foot length of the sheetpiling. The samples alternated between the sheet piling and the middle of the creek. SED-201 was taken at the south end of and adjacent to the sheet piling. SED-202 was taken 25 feet north of SED-201 and in the middle of the creek. SED-203 was taken 25 feet north of SED-202 and adjacent to the sheet piling, and so on. SED-207 was taken at the north end of and adjacent to the sheet piling. SED-208 was taken at the location of WD-02.

Table 4-1 presents the results of the sample analyses. All results are less than the 5 pCi/gram soil guideline. The results of SED-208 (and a duplicate taken at that location, SED-208D) show results below the concentration seen in WD-02.

TABLE 4-1

SEDIMENT SAMPLE RESULTS

Sample ID	Sediment Concentration, pCi/gram	
	Ra-226	Th-232
SED-201	1.7	1.6
SED-202	2.2	3.3
SED-203	3.5	2.8
SED-204	1.6	2.2
SED-205	1.7	4.0
SED-206	0.6	0.5
SED-207	2.6	1.4
SED-208	2.3	1.5
SED-208D	2.4	0.7

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During the original characterization of the facility, a sample taken in the top six inches at SL-28 yielded a Ra-226 concentration of 5.7 pCi/gram, just above the soll guideline. This area was resampled. The sample location was selected as follows:

1. The original SL-28 borehole location was determined.
2. A survey of the ground level exposure rate aromnd the location (within a 5-ft radius) was made.
3. The new sampling location was sited at the location of highest exposure rate.

The results of SL-201 (and the duplicate sample, SL-201D), taken at the location of SL-28 as described above, indicated Ra-226 concentrations well below the guidelines (1.2 pCi/gram and 0.7 pCi/gram for SL-201 and SL-201D, respectively). It is concluded that either the original sample result was incorrect or, more likely, the original sample contained the bulk of the contamination, i.e., SL-28 was the location of a small "hot spot" which was removed through the initial sampling.

As a result of these characterizations, it was fiuther concluded that the creek sediment and SL-28 did not reqiuire remediation. Results of the laboratoiy analyses are contained in Appendix C.

4.2 PHASE 2: REMEDIATION SAMPLING

The remediation sampling prognim was comprised of two separate types of sampling and analyses. The first type pf sample collection and analysis was used to guide the excavadon activities. Soil samples were collected and scieened onsite to deteimine if the remaining soil met the clean-up goals. Oiroe excavation was completed, a second type of sample was collected and analyzed. These samples were used to demonstrate the soil remaining in the excavation was "clean", i.e., below the soil gnidelines. In some instances, the first samples taken from an excavation location were used to demonstrate that the hole was clean. This secamd type of sample was sent to an analytical laboratoiy fdr analysis.

Table 4-2 presents the results of the sampling for the area around SL-38 and SL-96. The first two columns present the sample identification number and location. Figure 4-1 illustrates these locations. The concentration column ("Concen.") presents the estimate of soil concentrations above background based on the screeiiing results. This value was determined based on the relationship between screening results and activity in soil as discussed in Appendix B. For concentrations based on screening, conservative target levels of 4 pCi/gram in the first 6 inches and 12 pCi/gram in subsequent 6-inch depths were set to delineate contamination above the guidelines. Table 4-2 lists three locations, 382-02, 386-01, and 392-01, above the target Ra-226 concentration levels. These areas were resampled after further excavation. After acceptable levels were reached, confirmatoiy samples were taken and sent to the laboratoiy. Note that the sample from location 392-01, a sample with a concentration above the screening target, was also sent to the laboratoiy. This sample was sent to confirm the calibration of the screening system. Section B.3, in Appendix B, presents the results of this re-calibration.

The final column in Table 4-2 presents the results of the laboratory analyses for Ra-226. These values include the background levels of Ra-226, approximately 0.77 pCi/gram. It can be seen that all confirmatoiy sanqples are below the soil guidelines and in goαxi agreement with screening results.

Tables 4-3 and 4-4 present the sampling results for the excavations around SL-65 and SL-79, respectively. Figures 4-2 and 4-3 illustrate the sanipling locations for SL-6S and SL-79, respectively. Again, it can be seen that the sample resadts are bclow soil goidelines and ih gopd agreement with sceeening results. Oec exception is a series of wall sanıples in the SL-79 excavation.

Four wall samples taken from SL-79 were above the screening target. Subsequent laboratory analysis shpwed levels above the S pCi/gnun soil guideline. However, the excavation was stopped at this point due to the proximity of a building foundadan. Exposure rate ineasurenieits showed that the elevated readings were frpnı a extremely localized hot spot. After consultation with the New Jersey Department of Environniental Protection (NJDEP), it was decided that an

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TABLE 4-2
SL-38/96 EXCAVATION SOIL SAMPLING RESULTS

ID[3]	Sample Location	Depth	Concen. pCi/g	Resampled?/ Next Sample[2]	Split?/ Agency[3]	Sent to Lab? - Date[4]	Lab Results pCi/g[5]
382-02	N wall middle	6 - 12"	47.3	Yes/392	NO	NO	NA
383-01	N wall E side	0 - 6"	ND	NO	NO	NO	NA
384-02	E wall N eocnar	6 - 12"	4.2	NO	NO	NO	NA
385-02	E wall middle	6 - 12"	4.9	NO	NO	NO	NA
386-01	N wall S cornar	0 - 6"	11.8	Yes/404	NO	NO	NA
387-01	Floor, w sids mlddla	0 - 6"	0.96	NO	NO	Yes - 12/07/90	1.1
388-03	N wall N corner	12 - 18"	5.3	Yes	NO	NO	NA
389-01	Floor, w side	0 - 6"	ND	NO	NO	NO	NA
390-03	N wall mlddla	12 - 18"	2.2	NO	NO	NO	NA
391-02	N wall w corner	6 - 12"	2.8	NO	NO	Yes - 12/10/90	3.0
391-02S	N wall w corner	6 - 12"	0.9	NO	Yes/NJDEP	NO	NA
392-01	N wall middle	0 - 6"	33.8	Yes/394	NO	Yes - 12/10/90	34
393-02	N wall E aide	6 - 12"	ND	NO	NO	NO	NA
393-02D	N wall E side	6 - 12"	3.8	NO	NO	NO	NA
394-01	N wall mlddla	0 - 6"	7.2	NO	NO	NO	NA
394-01O	N wall middle	0 - 6"	0.8	NO	NO	NO	NA
395-02	N wall middle	6 - 12"	8.1	NO	NO	NO	NA
396-02	3 wall corner	6 - 12"	0.4	NO	NO	Yes - 12/10/90	1.1

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TABLE 4-2 (Continued)

ID[1]	Semple Location	Depth	Concen. pCi/g	Resampled?/ Next Sample[2]	Split?/ Agency[3]	Sent to Lab? - Date[4]	Lab Results pCi/g[5]
397-02	3 wall W aide	6 - 12"	0.4	NO	NO	NO	NA
398-01	Floor, SW corner	0 - 6"	0.3	NO	NO	Yes - 12/10/90	0.7
399-03	3 wall middle	12 - 18"	ND	NO	NO	Yes - 12/10/90	0.3
399-03S	S wall middle	12 - 18"	ND	NO	Yes/NJDEP	NO	NA
400-01	Floor, S middle	0 - 6"	ND	NO	NO	Yes - 12/10/90	0.6
400-01S	Floor, 3 middle	0 - 6"	0.24	NO	Yes/NJDEP	NO	NA
401-03	3 wall middle	12 - 18"	ND	NO	NO	Yes - 12/10/90	0.8
402-01	Floor, 3 middle	0 - 6"	ND	NO	NO	Yes - 12/10/90	0.8
403-01	Floor, NN corner	0 - 6"	5.3	NO	NO	Yes - 12/10/90	0.5
404-02	N wall middle	6 - 12"	ND	NO	NO	Yes - 12/10/90	1.1
404-023	N wall middle	6 - 12"	ND	NO	Yes/NJDEP	NO	NA
405-03	E wall middle	12 - 18"	ND	NO	NO	Yes - 12/10/90	0.7

Notea:

1. Sample identification number. "S" meana that the sample was a split sample. "D" Indicates a duplicate sample. "X" is an extra sample.
2. "Yea" entry indicates that location was resampled. The number indicates the new sample ID.
3. "Yea" entry indieatea that sample was a aplit for a regulatory agency. The agency was either the NRC or NJDEP.
4. "Yes" entry indicates that sample was sent to the analytical laboratory.
5. A numerical entry ia the concentration of Ra-226 in the sample. "NA" entry means the sample was not sent to the lab. "ND" entry means that the concentration was below the detection limit.

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TABLE 4-3
SL-65 EXCAVATION SOIL SAMPLING RESULTS

ID[1]	Sample Location	Depth	Concen. pCi/g	Resampled?/ Next Sample[3]	Split?/ Agency[3]	Sant to lab? - Date[4]	Lab Result[3] pCi/g
406-01	Floor, NE corner	0 - 6"	ND	NO	NO	Yes - 12/11/90	1.1
406-01D	Floor, NE corner	0 - 6"	ND	NO	NO	Yes - 12/11/90	0.5
406-013	Floor, NE corner	0 - 6"	ND	NO	Yes/NJDEP	NO	NA
407-03	E wall N side	12" - 18"	ND	NO	NO	NO	NA
408-04	E wall middle	18" - 24"	ND	NO	NO	Yes - 12/11/90	0.8
409-02	N wall E aide	6" - 12"	10.05	Yes/416	NO	NO	NA
409-04	N wall E side	18" - 24"	0.31	NO	NO	NO	NA
410-02	N wall W side	6" - 12"	ND	NO	NO	NO	NA
410-03	N wall N side	12" - 18"	ND	NO	NO	NO	NA
410-04	N wall N side	18" - 24"	WD	NO	NO	NO	NA
411-01	Floor, NN corner	0 - 6"	ND	NO	NO	Yes - 12/11/90	0.3
412-03	N wall middle	12" - 18"	0.35	NO	NO	NO	NA
413-03	N wall middle	12" - 18"	ND	NO	NO	NO	NA
414-01	Floor middle	0 - 6"	ND	NO	NO	NO	NA
415-01	3 wall middle	0 - 6"	ND	NO	NO	Yes - 12/12/90	ND
416-04	N wall middle	18" - 24"	ND	NO	NO	Yes - 12/12/90	0.7
417-06	N wall N side	30" - 36"	ND	NO	NO	Yes - 12/12/90	0.4
417-06D	N wall N side	30" - 36"	ND	NO	NO	Yes - 12/12/90	0.5
418-05	S wall middle	24' - 30"	ND	NO	NO	NO	NA
418-05D	S wall middle	24' - 30"	ND	NO	NO	NO	NA
419-01	Floor, SW corner	0 - 6"	ND	NO	NO	NO	NA
419-01D	Floor, SW corner	0 - 6"	ND	NO	NO	NO	NA
420-03	W wall middle	12" - 18"	ND	NO	NO	Yes - 12/12/90	0.6
421-01	Floor, middle	0 - 6"	ND	NO	NO	NO	NA

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TABLE 4-3 (Continued)

ID[1]	Sample Location	Depth	Concen. pCi/g	Resampled?/ Next Sample[2]	Split?/ Agency[3]	Sent to lab? - Date[4]	Lab Result[5] pCi/g
422-04	SE corner wall	18" - 24'	ND	NO	NO	NO	NA
423-01	Floor, middle	0 - 6"	0.94	NO	NO	Yes - 12/12/90	0.9
423-01D	Floor, middle	0 - 6"	2.23	NO	NO	NO	NA
424-01	E wall S side	0 - 6"	ND	NO	NO	NO	NA
424-01D	E wall S side	0 - 6"	ND	NO	NO	NO	NA
425-01	Floor, SE corner	0 - 6"	ND	NO	NO	Yes - 12/12/90	0.4
425-01S	Floor, SE corner	0 - 6"	ND	NO	Yes/NJDEP	NO	NA

Notes:

1. Sample identification number. "S" means that the sample was a split sample. "D" indicates a duplicate sample. "X" is an extra sample.
2. "Yes" entry indicates that location was resampled. The number Indicates the new sample ID.
3. "Yes" entry indicates that sample was a split for a regulatory agency. The agency was either the NRC or NJDEP.
4. "Yes" entry indicates that sample was sent to the analytical laboratory.
5. A numerical entry is the concentration of Ra-226 in the sample. "NA" entry means the sample was not sent to the lab. "ND" entry means that the concentration was below the detection limit.

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TABLE 4-4

SL-79 EXCAVATION SOIL SAMPLING RESULTS

ID[1]	Sampla Location	Depth	Concen. pCi/g	Resampled?/ Next Sample[3]	Split?/ Agency[3]	Sent to Lab? - Date[4]	Lab Results[3] pCi/g
340-04	N wall N side	18" - 24"	6.07	Yes/347	NO	Yes - 12/05/90	4.9
341-04	SE corner wall	18" - 24"	2.5	Yes/349	NO	NO	NA
342-01(06)	Floor, NN cornar	30" - 36"	ND	NO	NO	NO	NA
343-01(06)	Floor, N sido	30" - 36"	ND	NO	NO	Yes - 12/05/90	0.8
344-02	E side undar cohc.	6" - 12"	18.96	Yes/351	NO	Yes - 12/05/90	8.1
345-01(06)	Floor, S side mlddle	30" - 36"	3.15	NO	NO	NO	NA
346-01(06)	Floor, S side middle	30" - 36"	1.35	NO	NO	NO	NA
347-04	Wall, N side	18" - 24"	1.59	NO	NO	NO	NA
348-01(06)	Floor, SE side	30" - 36"	1.18	NO	NO	Yes - 12/06/90	3.0
349-04	S wall E side	18" - 24"	ND	NO	NO	Yes - 12/06/90	1.5
350-04	S wall middle	18" - 24"	0.02	NO	NO	Yes - 12/06/90	2.0
351-04	E wall S side	18" - 24"	24.4	Yes/355	NO	NO	NA
352-04	S wall under ramp	IS" - 24"	11.9	Yes/368	NO	NO	NA
352-04D	S wall under ramp	18" - 24"	8.15	Yes/368	NO	NO	NA
353-04	S wall under ramp	18" - 24"	3.2	NO	NO	NO	NA
354-04	E wall under conc.	18" - 24"	20.3	Yes/357	NO	NO	NA
355-04	E wall under conc.	18" - 24"	22.1	Yes/358	NO	NO	NA
356-04	E wall under conc.	18" - 24"	11.7	Yes/359	NO	NO	NA

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TABLE 4-4 (Continued)

ID[2]	Sample Location	Depth	Concen. pCi/g	Resampled?/ Next Sample[3]	Split?/ Agency[3]	Sent to Lab? - Date[4]	Lab Results[5] pCi/g
357-04	E wall under cono.	18" - 24"	ND	NO	NO	Yes - 12/06/90	0.5
358-04	E wall under cpnc.	18" - 24"	ND	NO	NO	NO	NA
359-04	E wall undar cphe.	18" - 24"	ND	NO	NO	Yes - 12/06/90	2.7
360-04	N wall W alds	18" - 24"	ND	NO	NO	Yes - 12/06/90	0.6
361-03	N wall W side	12" - 18"	ND	NO	NO	NO	NA
362-01	N wall N slde	0 - 6"	ND	NO	NO	Yes - 12/06/90	1.0
362-01S	N wall N side	0 - 6"	ND	NO	Yes/NJDEP	NO	NA
363-04	E wall N aide	18" - 24"	0.53	NO		Yes - 12/06/90	0.3
363-043	E wall N side	18" - 24"	NA	NO	Yes/NJDEP	NO	NA
364-03	N wall N side	12" - 18"	ND	NO	NO	Yes - 12/06/90	0.3
365-04	N wall at N and	18" - 24"	ND	NO	NO	NO	NA
366-01	Floor, NN corner	0 - 6"	ND	NO	NO	Yea - 12/06/90	0.3
367-01	S wall under ramp	0 - 6"	3.33	NO	NO	NO	NA
368-04	S wall under ramp	18" - 24"	0.839	NO	NO	NO	NA
369-01	S wall under ramp	0 - 6"	5.14	Yes/374	NO	NO	NA
370-05	3 wall undar ramp	24" - 30"	0.07	NO	NO	NO	NA
371-05	S wall N of ramp	24" - 30"	4.04	Yes/375	NO	NO	NA
372-03	3 wall E of ramp	12" -18"	18.5	Yes/379	NO	NO	NA

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TABLE 4-4 (Continued)

ID[1]	Sample Location	Depth	Concen. pCi/g	Resampled?/ Next Sample[2]	Split?/ Agency[3]	Sent to Lab? - Date[4]	Lab Results[5] pCi/g
373-04	3 wall at E end	18" - 24"	9.8	NO	NO	Yes - 12/07/90	12
373-04D	S wall at E end	18" - 24"	14.29	NO	NO	NO	NA
374-04	S wail at E end	18" - 24"	1.52	NO	NO	Yes - 12/07/90	5.0
374-04	S wall at E end	18" - 24"	4.0	NO	NO	NO	NA
374-04D	S wall at E end	18" - 24"	5.08	NO	NO	NO	NA
375-04	W wall S side	18" - 24"	ND	NO	NO	Yes - 12/07/90	0.6
375-043	W wall S side	18" - 24"	2.0	NO	Yes/NJDEP		NA
376-04	W wall middle	18" - 24"	11.1	Yes/381	NO	NO	NA
377-04	W wall middle	18" - 24"	9.2	Yes/378	NO	NO	NA
378-01	W wall middle	0 - 6"	9.8	NO	NO	Yes - 12/07/90	7.5
379-01	S wall middle	0 - 6"	5.0	WO	NO	Yes - 12/07/90	9.3
380-01	S wall W side	0 - 6"	10.4	NO	NO	Yes - 12/07/90	7.9
381-01	W wall middle	0 - 6"	7.9	NO	NO	Yes - 12/07/90	6.5

Notes:

1. Sample identification number. "3" meana that the sample was a split sample. "D" indicates a duplicate sample. "X" is an extra sampla.
2. "Yea" entry indieates that location waa reaampled. The number indieates the new sample ID.
3. "Yea" entry indieatea that aample was a split for a regulatory agency. The agency was either the NRC or NJDEP.
4. "Yes" entry indicates that aample was sent to the analytical laboratory.
5. A numerloal entry ia the conoentration of Ra-226 in the sample. "NA" entry means the aample was not sent to the lab. "ND" entry means that tha concentration was below the detection limit.

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average concentration over 4 square meters was to be used to determine compliance with the soil guidelines. This averaging technique is 25 times as stringent as the 100 square meter technique outlined as part of the DOE soil guidelines.

In addition to the Ra-226 contamination around the site, drums with Ra-226 and Th-232 were used as riprap along a creek bank. As part of the remediation effort, the drums and surrounding soils were excavated. Table 4-5 presents the results of the confirmatory sampling effort. Again, the results of the laboratory analyses show that the contaminated material was completely removed and that the remaining soil has concentrations below cleanup goals. Table 4-6 presents the results and a comparison of the confirmatory split samples provided to the NRC. Table 4-7 presents the results of the split samples analyzed by NJDEP. These results include samples from the other excavations. As shown each split sample confirms that the area is free of contaminated material. Figure 4-4 illustrates the sample locations for the creek bank.

4.3 INDOOR RADIATION RESURVEY

As a result of the survey discussed in Section 2.2.4 it was decided to resurvey the DCASPRO production area using a finer grid pattem. A square grid was established using a 2 meter spacing. Twenty grid points were established, to ensure complete coverage of the area.

Background measurements were taken using a gamma exposure meter in an area in the plant not influenced by the potential sources previously discussed (Section 2.2.4). The resulting average exposure of twenty measurements was 3.45 uR/hr.

Measurements were then taken at each grid point. Five readings were taken at three separate elevations, ground level, 1 meter and 2 meters. The results were as follows: With the exception of points along the base of the main stmctural wall, all points were at background (3.0 to 4.5 uR/hr). At the structural wall where the floor and wall meet, the maximum reading was 8.36 uR/hr, or 16 mrem/year (including 7 mrem/year background) for a 2000 hour exposure. This

TABLE 4-5

CREEK BANK EXCAVATION SOIL SAMPLING RESULTS

ID'	Sample Location	Depth	Concen. (pCi/g)	Resampled?/ Next Sample'	Split?/ Agency'	Sent to Lab? -Date[4]	Lab Results' pCi/g
300-01	20' SNBE top of slope	0 - 6"	ND	NO	NO	NO	NA
300-02	20' SNBE top of slope	6" - 12"	ND	NO	NO	NO	NA
300-03	20' SNBE top of slope	12" - 18"	ND	NO	NO	NO	NA
300-04	20' SNBE top of slope	18" - 24"	ND	NO	NO	NO	NA
301-01	10' SNBE	0 - 6"	ND	NO	NO	NO	NA
301-02	10' SNBE	6" - 12"	ND	NO	NO	NO	NA
301-03	10' SNBE	12" - 18"	ND	NO	NO	NO	NA
301-04	10' SNBE	18" - 24"	0.13	NO	NO	Yes - 11/30/90	0.4,0.4
302-01	33.5' SNBE	0 - 6"	3.2	Yes/334	NO	NO	NA
302-01S	33.5' SNBE	0 - 6"	2.7	Yes/334	Yes/NRC	NO	NA
303-01	45.5' SNBE	0 - 6"	2.5	Yes/335	NO	NO	NA
303-01S	45.5' SNBE	0 - 6"	3.7	Yes/335	Yes/NRC	NO	NA
304-02	28' SNBE	6" - 12"	0.85	NO	NO	Yes - 11/30/90	0.7,1.0
304-02S	28' SNBE	6" - 12"	0.86	NO	Yes/NRC	NO	NA
305-04	38' SNBE	18" - 24"	1.02	NO	NO	Yea - 11/30/90	1.0,1.4
305-043	38' SNBE	18" - 24"	2.0	NO	NO	NO	NA
306-03	50' SNBE	12" - 18"	2.02	NO	NO	NO	NA
306-03S	50' SNBE	12" - 18"	2.33	NO	Yes/NJDEP	NO	NA

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TABLE 4-5 (Continued)

ID[1]	Sample Location	Depth	Concen. (pCi/g)	Resampled?/ Next Sample'	Split?/ Agency'	Sent to Lab? -Date[4]	Lab Results' pCi/g
306-03D	50' SNBE	12" - 18"	2.57	NO	NO	NO	NA
307-01	55' SNBE	0 - 6"	3.87	Yes/333	NO	NO	NA
307-01D	55' SNBE	0 - 6"	3.53	Yes/333	NO	NO	NA
308-04	60' SNBE	18" - 24"	0.21	NO	NO	Yes - 12/03/90	0.8,1.0
308-04D	60' SNBE	18" - 24"	0.93	NO	NO	NO	NA
309-01	65' SNBE	0 - 6"	4.23	Yes/337	NO	NO	NA
309-01D	65' SNBE	0 - 6"	4.22	Yes/337	NO	NO	NA
309-013	65' SNBE	0 - 6"	4.02	Yes/337	Yes/NRC	NO	NA
310-02	70' SNBE	6" - 12"	0.94	NO	NO	NO	NA
310-02D	70' SNBE	6" - 12"	1.78	NO	NO	NO	NA
311-01	75' SNBE	0 - 6"	3.5	Yes/338	NO	NO	NA
311-01D	75' SNBE	0 - 6"	3.53	Yes/338	NO	NO	NA
312-05	80' SNBE	24" - 30"	ND	NO	NO	Yes - 12/03/90	1.3,1.2
312-05D	80' SNBE	24" - 30"	ND	NO	NO	NO	NA
313-01	85' SNBE	0 - 6"	1.07	NO	NO	NO	NA
313-01D	85' SNBE	0 - 6"	2.13	NO	NO	NO	NA
314-02	90' SNBE	6" - 12"	1.21	NO	NO	Yes - 12/03/90	1.2,0.9
314-02S	90' SNBE	6" - 12"	0.007	NO	Yes/NRC	NO	NA

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TABLE 4-5 (Continued)

ID'	Sample Location	Depth	Concen. (pCi/g)	Resampled?/ Next Sample'	Split?/ Agency'	Sent to Lab? -Date'	Lab Results' pCi/g
315-01	95' SNBE	0 - 6"	6.52	Yes/336	NO	NO	NA
315-013	95' SNBE	0 - 6"	7.81	Yes/336	Yes/NJDEP	NO	NA
316-04	100' SNBE	18" - 24"	3.06	Yes/347A	NO	NO	NA
316-04S	100' SNBE	18" - 24"	1.45	Yes/347A	Yes/NJDEP	NO	NA
317-01	105' SNBE	0 - 6"	7.33	Yes/345A	NO	NO	NA
317-01D	105' SNBE	0 - 6"	10.01	Yes/345A	NO	NO	NA
318-03	110' SNBE	12" - 18"	1.08	NO	NO	NO	NA
318-03D	110' SNBE	12" - 18"	2.59	NO	NO	NO	NA
319-01	115' SNBE	0 - 6"	2.4	NO	NO	Yes - 12/03/90	0.8,1.4
319-01D	115' SNBE	0 - 6"	1.94	NO	NO	Yes - 12/03/90	0.5,1.2
319-013	115' SNBE	0 - 6"	NA	NO	Yes/NJDEP	NO	NA
320-02	120' SNBE	6" - 12"	4.47	Yes/348A	NO	NO	NA
320-02D	120' SNBE	6" - 12"	7.87	Yes/348A	NO	NO	NA
321-01	125' SNBE	0 - 6"	2.3	NO	NO	Yes - 12/03/90	0.1,1.0
321-013	125' SNBE	0 - 6"	1.59	NO	Yes/NRC	NO	NA
322-04	130' SNBE	18" - 24"	0.14	NO	NO	NO	NA
322-04D	130' SNBE	18" - 24"	1.18	NO	NO	NO	NA
323-01	135' SNBE	0 - 6"	1.43	NO	NO	Yes - 12/03/90	1.0,1.1

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TABLE 4-5 (Continued)

ID'	Sample Location	Depth	Concen. (pCi/g)	Resampled?/ Next Sample'	Split?/ Agency'	Sent to Lab? -Date'	Lab Results' pCi/g
323-01S	135' SNBE	0 - 6"	1.12	NO	Yes/NJDEP	NO	NA
323-01X	135' SNBE	0 - 6"	0.92	NO	NO	NO	NA
324-05	140' SNBE	24" - 30"	ND	NO	NO	Yes - 12/03/90	0.9,1.2
324-050	140' SNBE	24" - 30"	ND	NO	NO	Yes - 12/03/90	0.6,1.7
324-05S	140' SNBE	24" - 30"	NA	NO	Yes/NJDEP	NO	NA
325-01	145' SNBE	0 - 6"	0.42	NO	NO	Yes - 12/03/90	1.0,0.9
325-01D	145' SNBE	0 - 6"	ND	NO	NO	Yes - 12/03/90	1.3,1.3
326-05	24' SNBB	24" - 30"	2.86	NO	NO	NO	NA
327-01	28' SNBE	0 - 6"	0.75	NO	NO	NO	NA
328-01	24' SNBE	0 - 6"	1.2	NO	NO	NO	NA
329-04	33.5' SNBE	18" - 24"	1.07	NO	NO	NO	NA
330-02	105' SNBE	6" - 12"	1.72	NO	NO	NO	NA
331-01	120' SNBE	0 - 6"	2.66	NO	NO	NO	NA
332-03	115' SNBE	12" - 18"	3.74	NO	NO	NO	NA
333-03	50' SNBE	12" - 18"	NO	NO	NO	Yes - 12/05/90	0.9,1.6
334-01	33.5' SNBE	0 - 6"	1.43	NO	NO	Yes - 12/05/90	0.8,1.3
335-01	45.5' SNBE	0 - 6"	1.69	NO	NO	NO	NA
336-03	95' SNBE	12" - 18"	ND	NO	NO	Yes - 12/05/90	1.0,1.4

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TABLE 4-5 (Continued)

10[1]	Sample Location	Depth	Concen. (pCl/g)	Resampled?/ Next Sample'	Split?/ Agency'	Sent to Lab? -Date'	Lab Results' pCl/g
336-03S	95' SNBB	12" - 18"	NO	NO	Yes/NJDEP	NO	NA
337-01	65' SNBE	0 - 6"	2.3	Yes/349A	NO	NO	NA
337-01S	65' SNBE	0 - 6"	3.07	Yes/349A	Yes/NJDEP	NO	NA
338-01	75' SNBB	0 - 6"	1.4	NO	NO	NO	NA
34SA-01	105' SNBB	0 - 6"	1.47	NO	NO	Yes - 12/05/90	0.7,1.1
346A-D1	120' SNBB	0 - 6"	NO	NO	NO	Yes - 12/05/90	1.1,1.4
346A-01S	120' SNBB	0 - 6"	NO	NO	Yes/NJDEP	NO	NA
347A-OS	ICO' SNBB	24" - 30"	1.0	NO	NO	Yes - 12/05/90	0.8,0.8
348A-04	120' SNBB	18" - 24"	0.16	NO	NO	Yes - 12/05/90	0.7,0.9
349A-01	65' SNBB	0 - 6"	0.97	NO	NO	Yes - 12/05/90	0.7,1.2
349A-01	65' SNBB	D - 6"	2.5	NO	Yes/NJDEP	NO	NA

Notes:

1. Sample identification number. "S" means that the sample was a split saople. "D" indicates a duplicate sample. "X" is an extra sample.
2. "Yea" entry indicates that location was resampled. The number indicates the new sample ID.
3. "Yes" entry indicates that sanple waa a split for a regulatory agency. The agency was either the NRC or NJDEP.
4. "Yea" entry indicates that sample was aent to the analytical laboratory.
5. A numerical entry is the concentration of Ra-226 in the sample. "NA" entry means the sample was not sent to the lab. "ND" entry means that the concentration was below the detection linit.

ATTACHMENT D41

TABLE 4-6

Comparison of NRC and Allied Creek Bank Split Samples

Sample ID	NRC Concentration (pCi/g)[1,3]	Allied Concentration (pCi/g)
302	0.85	2.7[3]
303	0.8	3.7[3]
304	0.7	0.7
309	1.13	4.02[3]
314	1.4	1.2
321	0.77	0.1

1 Reference: Letter - John Kinneman NRC to Mark Schwind Allied-Signal Bendix Aerospace Company, May 8, 1991.

2 Results for Ac-228

3 Soil screening estimate. Sample was not sent to analytical laboratory.

TABLE 4-7

Comparison of NJDEP and Allied Split Samples

	Ra-226 Concentration, pCi/g	
Sample ID	NJDEP[1]	Allied
SL-306-03	0.66	2.3[2]
SL-319-01	1.10	0.8
SL-321-01	0.85	0.1
SL-323-01	0.94	1.0
SL-324-05	0.87	0.9
SL-391-02	1.50	3.0
SL-336-03	0.78	1.0
SL-337-01	1.10	3.1[2]
SL-346A-01	1.10	1.1
SL-349-01	0.83	0.7
SL-399-03	0.26	0.3
SL-400-01	0.52	0.6
SL-362-01	0.82	1.0
SL-363-04	0.46	0.3
SL-406-01	0.50	0.5
SL-404-02	0.79	1.1
SL-425-01	0.34	0.4

1 Refsrence: Letter - Steve Boykewich, NJDEP, to Les Skoski, Ebasco, May 16, 1991. See Appendix C.

2 Soil screening estimate. Sample was not sent to analytical laboratory.

ATTACHMENT D-43

elevated dose rate is most likely a result of the construction material used and does not require a remedial action. This conclusion is corroborated further by the measurements taken at the 1-meter and 2-meter heights; at 1 meter the exposure rate reduces to about 5 uR/hr, while at two meters the exposme rate is similar to the rest of the area, about 4 uR/hr. The 1-meter height corresponds to the exposure point for an individual. This exposure rate is slightly above backgromd and does not represent a significant risk to an individual woiking in the room.

5.0 CONCLUSIONS AND RECOMMENDATION

The conclusion supported by the prior sections is that all areas characterized as requiring remediation have been fully remediated. All contaminated materials, inclusive of the waste in the creek bank, the comingled soils in the creek bank, and the hot spot soil have been removed from the site and properly disposed of at a licensed NORM waste facility. The site remediation was corroborated by extensive surveying and testing to assure that all remaining areas are below the established radium and thorium guidelines. In addition, split samples with the NRC confinn the results. Given the evidence, it is recommended that all areas and the total site be released for unrestricted use.

ATTACHMENT D45

ATTACHMENT E

ECRA CASE #86914

Allied-Signal Aerospace Company

Allied Signal

ECRA Cleanup Plan

for the

Allied-Signal Aerospace Teterboro Facility Teterboro, New Jersey

Prepared by

EBASCO ENVIRONMENTAL

A Division of Ebasco Services Incorporated

April 1991

ATTACHMENT E

ECRA CLEANUP PLAN
ALLIED-SIGNAL AEROSPACE COMPANY
TETERBORO FACILITY

CONTENTS

ATTACHMENT E-2

CONTENTS (Cont'd)

ATTACHMENT E3

TABLES

ATTACHMENT E4

FIGURES

ATTACHMENT E5

FIGURES (Cont'd)

PLATES
(In plastic pockets inside back cover)

ATTACHMENT E-6

1.0 INTRODUCTION

1.1 PURPOSE AND ORGANIZATION OF REPORT

This document is issued pursuant to the directive issued February 2, 1990 and December 13, 1990 by the New Jersey Department of Environmental Protection (NJDEP Directive) which required the Allied-Signal Aerospace Company to conduct a supplemental field sampling program on their properties in Teterboro, New Jersey and to propose a cleanup plan in order to comply with the New Jersey Environmental Cleanup Responsibility Act (ECRA). The Final Field Sampling Plan Results Report (November 1990) and the Supplemental Field Sampling Report (Chemical Characterization Report, April 1991) for the Allied-Signal Aerospace Teterboro Facility document the findings of the investigation and form the basis for the proposed cleanup plan. These Field Sampling Reports include documentation of the nature and extent of the contamination associated with soil and groundwater.

The proposed cleanup plan provides background information on the site and describes remedial actions being considered to remediate the site contamination posed by contaminated soil and groundwater.

The soil and groundwater cleanup objectives are;

- to provide and ensure protection of groundwater and surface water from the contamination in the soil in compliance with NJ ECRA requirements; and

- to prevent migration of contaminants in the groundwater and to restore groundwater quality consistent with chemical-specific Applicable and Relevant or Appropriate Requirements (ARARs).

ATTACHMENT E7

This report, comprised of eight sections, was prepared following the latest NJDEP Cleanup Plan Directive of December 13, 1990. Section 1.0 presents background information regarding site location and history. Section 2.0 presents a summary of environmental concerns including nature and extent of contamination determined from the field sampling records. Section 3.0 presents the proposed remedial actions and describes the design criteria and major facility and construction components for both contaminated soil and groundwater cleanup actions. Section 4.0 presents the cleanup levels to be achieved as a result of both soil and groundwater cleanup actions. Section 5.0 presents a cleanup work plan to document the scope, procedure and schedule (time table) to implement the soil and groundwater cleanup actions. Section 6.0 presents a post-remediation sampling and monitoring plan for the groundwater treatment system and the site groundwater restoration evaluation. Section 7.0 presents the types of progress reports that will be periodically submitted to NJDEP for the duration of the soil and groundwater cleanup operations. Section 8.0 presents cost estimates of soil and groundwater cleanup actions including capital costs, operation and maintenance costs, monitoring system costs, laboratory costs, legal and administrative costs and contingency costs.

1.2 SITE BACKGROUND INFORMATION

1.2.1 Site Location

The Allied Facility is located in the Borough of Teterboro, Bergen County, New Jersey and is bounded to the north by Route 46, to the west by Route 17, to the east by Industrial Avenue, and to the south by the properties of Metpath, Inc. and Sumitomo Machinery Corporation of America (Figure 1-1).

The Facility occupies approximately 71 acres and consists of several manufacturing buildings, the largest of which is Plant No. 1, and approximately fifteen support buildings including: a

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hazardous waste storage building, a chemical storage building, a wastewater treatment building, two engineering buildings, and a boiler house which supplies both heat and steam to the facility (Figure 1-2).

1.2.2 Site History

A property of approximately 101 acres was acquired by the Bendix Corporation (Bendix) in 1937. In 1941, Bendix sold a large portion of the property to the U.S. Department of Defense (Navy) to build and operate a foundry for the production of magnesium and aluminum castings. In addition to the foundry, the Navy site included a sanitary sewage treatment facility and a small document incinerator. Bendix acquired the property back from the Navy in 1961, ceased the foundry operation in 1968, and converted the property for use as office space in 1969.

In 1977, Bendix sold 22 acres of the southwestern portion of the property to Methpath Inc. and Sumitomo. The properties purchased by Sumitomo contained the Navy's former sewage treatment facility and document incinerator. The transfer of the remaining 71 acres of the property from the Bendix Corporation to the Allied-Signal Company occurred in 1985.

NJDEP listed the site as ECRA Case #86914 pursuant to the Environmental Cleanup Responsibility Act (ECRA N.J.S.A. 13:1K-6 et seq). Allied-Signal submitted a Field Sampling Plan to NJDEP which was revised in October 1987 and April 1988. The "Final ECRA Chemical Field Sampling and Analysis Plan for the Allied Signal Property" was submitted on January 1990. On February 2, 1990, NJDEP issued a directive to conditionally approve the Field Sampling Plans which required a proposed cleanup plan. The "Final Sampling Plan" was modified and approved by NJDEP on February 16, 1990.

Ebasco Services Incorporated conducted the Field Sampling program and completed the "Final Field Sampling Plan Results Report" in August 1990.

It was evident from this report, that additional characterization of the Teterboro site was warranted. Accordingly, a Supplemental Field Sampling Plan was submitted to the NJDEP and approved on December 13, 1990, and the "Chemical Characterization Report" was completed in April 1991.

1.2.3 Site Topography, Geology and Hydrology

Physiography

The Allied-Teterboro Facility is located in the Piedmont physiographic province which consists of gently rolling surfaces that slope gradually from the highlands in the north to the coastal plain in the south. In the immediate vicinity of the facility, the topography is characterized by low lying tidal marshlands. The surface elevations remain less than 10 ft above sea level.

Regional Geology Setting

The Facility located in the Hackensack River basin is underlain by Jurassic and Triassic rocks of the Newark Group as well as glacial deposits of the Pleistocene age. The rock of the Newark Group consists of three formations referred to as the Stockton, Lockatong and Brunswick. The glacial deposits of the Pleistocene age overlie the Brunswick Formation which overlies the Lockatong and Stockton Formations. The unconsolidated deposits are comprised of sand, gravel, silt and clay with thickness ranging from 25 to 300 feet.

Local Geology Setting

The Facility is underlain by 3 to 12 ft of structural fill which is primarily composed of a brown coarse to fine grained sand, with lesser amounts of silt and gravel. A cross-section of the shallow soil stratigraphy at the site is shown in Figure 1-3. The organic rich Holocene sediments are present beneath the fill in a 2 to 3 ft thick layer throughout the site.

Hydrology

Parallel to the eastern and western facility boundaries are two storm water drainage ditches (channels) which serve as part of the Bergen County drainage system (Figure 1-2). At present these ditches are used to collect and channel surface water runoff directly and/or piped discharge lines located throughout the facility, as well as from areas upgradient of the Facility. The eastern and western storm water drainage ditches are connected by three subsurface, east-west trending equalization ditches which serve as overflow lines between the two boundary channels.

In the area underlying the Facility, the surface of the water table generally occurs at 1-3 ft below the ground surface. The occurrence of the shallow groundwater aquifer appears to be restricted to those sediments (fill and Holocene organic rich deposits) overlying the relatively impermeable varved Pleistocene clays. In general, the groundwater flow radiates outwardly (i.e., west, south and east) from a central high point located to the west of the Chemical Storage Building (Figure 1-4, 1-5 and 1-6). The groundwater gradient is generally flat and the lateral groundwater movement is slow. The vertical component of flow is restricted by the underlying clay.

ATTACHMENT "E"

Recharge to this area appears to be limited to unpaved areas which allow for infiltration of precipitation. However, most of the Facility area is either paved or covered by buildings.

A slug test was conducted at 10 monitoring wells utilizing the rising head method except for Well OS-01 where the falling head method was utilized to determine hydraulic conductivity for the site's shallow aquifer. As shown in Table 1-1, the hydraulic conductivity of the shallow aquifer is in the range of 10^{-3} to 10^{-4} cm/sec.

TABLE 1-1

ALLIED TETERBORO FACILITY
HYDRAULIC CONDUCTIVITY MEASUREMENTS

Well Number	Hydraulic Conductivity (1)	Test Type
CS-06	$1.0E^{-4}$ cm/sec	Rising Head
CS-07	$1.3E^{-4}$ cm/sec	Rising Head
CS-13	$1.6E^{-3}$ cm/sec	Rising Head
CS-15	$4.IE^{-4}$ cm/sec	Rising Head
CS-16	$2.7E^{-4}$ cm/sec	Rising Head
CS-18	$3.4E^{-5}$ cm/sec	Rising Head
WT-01	$3.3E^{-4}$ cm/sec	Rising Head
WT-05	$6.8E^{-3}$ cm/sec	Rising Head
WT-06	$3.6E^{-4}$ cm/sec	Rising Head
OS-01	$3.2E^{-4}$ cm/sec	Falling Head

Note: (1) Hydraulic conductivity calculated using: Bower, H. and R.C. Rice, 1976, "A slug test for determining hydraulic conductivity of unidentified aquifers with completely or partially penetrating wells", Water Resources Research, v.12, pp. 423-428.

2.0 SUMMARY OF ENVIRONMENTAL CONCERNS

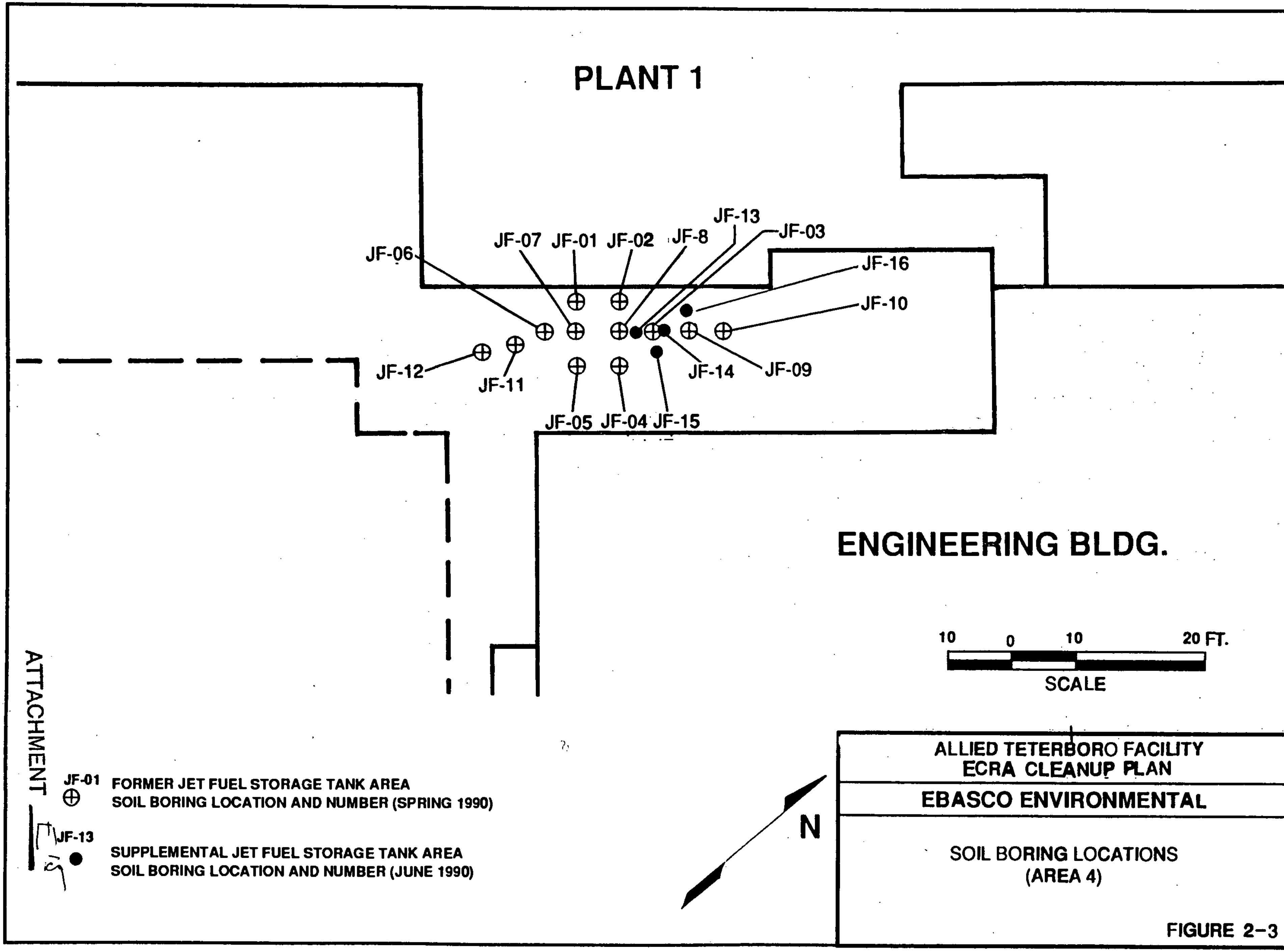
2.1 PREVIOUS INVESTIGATION

In July 1984, Leggettee, Brashears and Graham, Inc. (LBG) of Wilton, Connecticut, conducted a limited hydrogeologic investigation at the Teterboro Facility on behalf of the Allied-Signal Aerospace Company. This investigation was restricted to the area immediately surrounding the Chemical Storage Building. In December of 1985, the investigation was expanded to include the area formerly occupied by a Waste Solvent Tank.

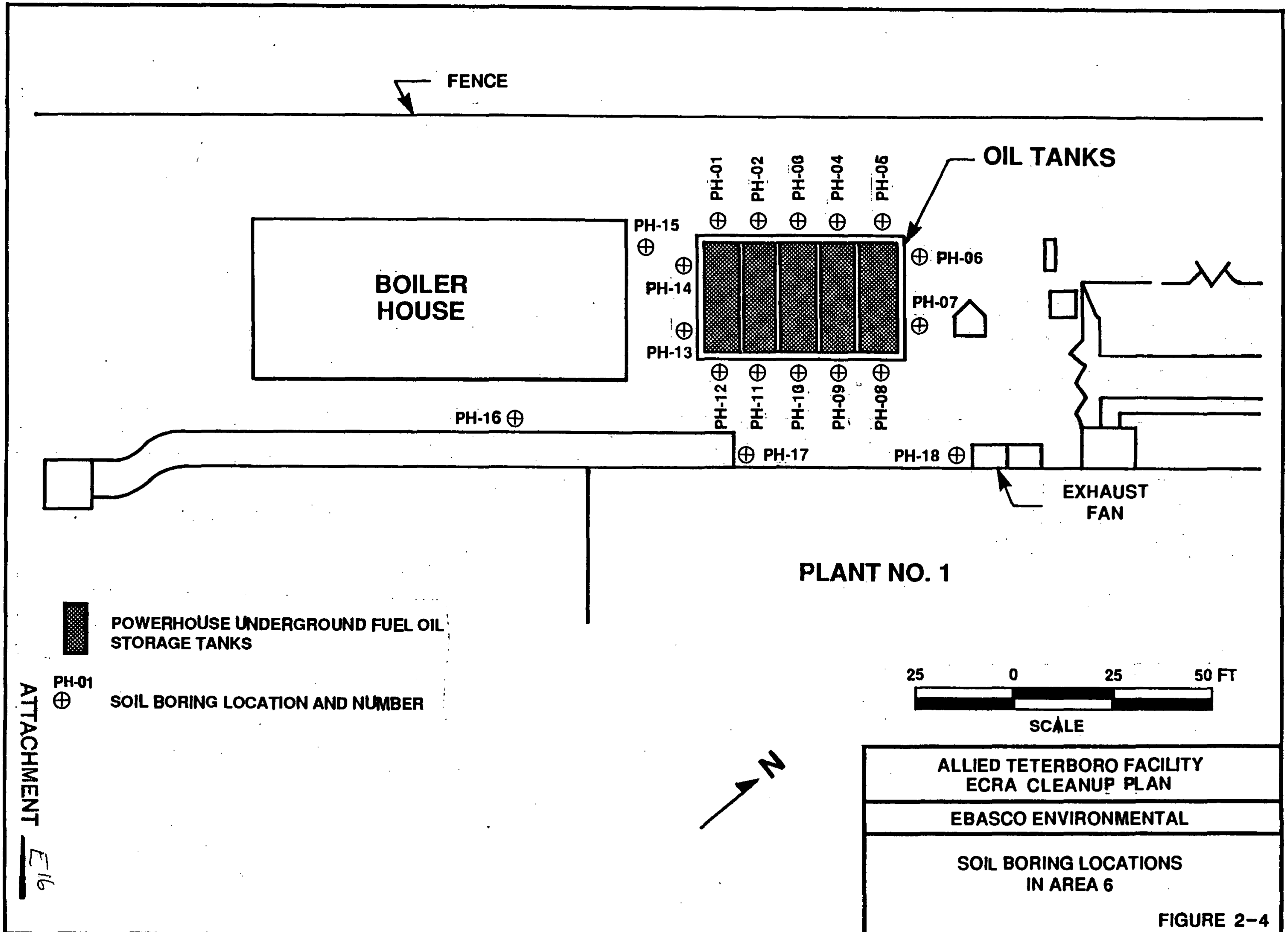
LBG's 1984 investigation included the installation and sampling of ten groundwater monitoring wells in the vicinity of the Chemical Storage Building. Analysis of groundwater samples from these wells indicated the presence of a number of volatile organic compounds (VOCs). The compounds detected include: methylene chloride; 1, 1-dichloroethene; toluene; 1,2 trans-dichloroethane; 1,1,1-trichloroethene; and vinyl chloride. Arsenic was the only inorganic compound detected.

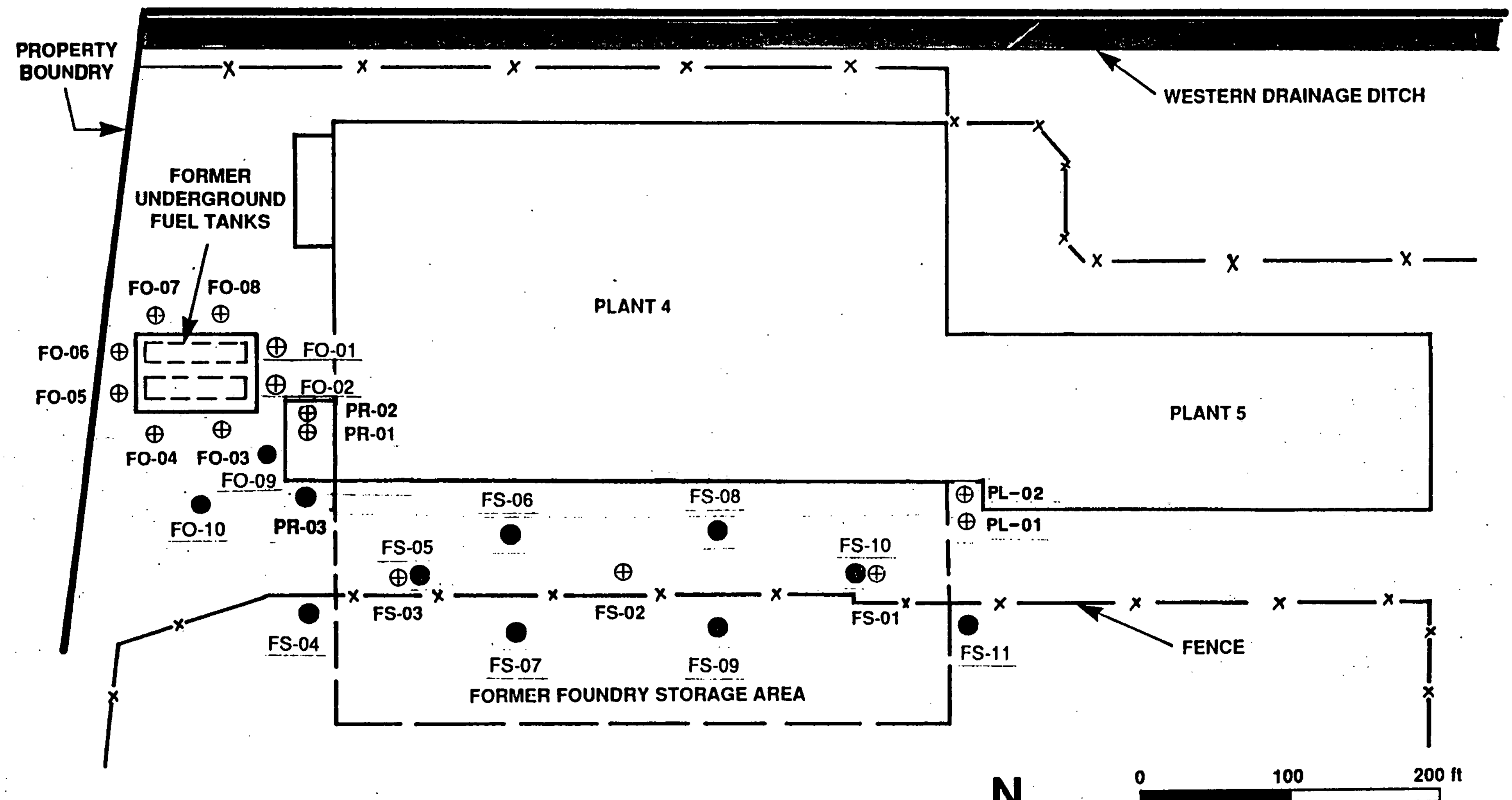
As a result of the hydrogeologic investigation conducted by LBG, a "French drain" system was installed in the vicinity of the Chemical Storage Building (Area 1) to channel and collect groundwater. In addition, the area surrounding the Chemical Storage Building was paved with an asphalt cap.

Soil samples collected by LBG in the vicinity of the former Waste Solvent Tank exhibited elevated levels of chromium. Elevated readings on the organic vapor analyzer (OVA) during air monitoring of the sampling activities in the tank area were also noted. However, volatile organic analyses were not performed on any of the samples collected in this area.



PLANT 1
JF-06
JF-07
JF-01
JF-02
JF-8
JF-13
JF-03
JF-16
JF-10
JF-12
JF-11
JF-05
JF-04
JF-15
JF-14
JF-09
ENGINEERING BLDG.
10 0 10 20 FT.
SCALE
N
ATTACHMENT
JF-01
FORMER JET FUEL STORAGE TANK AREA
SOIL BORING LOCATION AND NUMBER (SPRING 1990)
JF-13
SUPPLEMENTAL JET FUEL STORAGE TANK AREA
SOIL BORING LOCATION AND NUMBER (JUNE 1990)
ALLIED TETERBORO FACILITY
ECRA CLEANUP PLAN
EBASCO ENVIRONMENTAL
SOIL BORING LOCATIONS
(AREA 4)
FIGURE 2-3


FENCE
OIL TANKS
BOILER HOUSE
PH-01
PH-02
PH-03
PH-04
PH-05
PH-06
PH-07
PH-08
PH-09
PH-10
PH-11
PH-12
PH-13
PH-14
PH-15
PH-16
PH-17
PH-18
EXHAUST FAN
PLANT NO. 1
POWERHOUSE UNDERGROUND FUEL OIL STORAGE TANKS
PH-01 SOIL BORING LOCATION AND NUMBER
25 0 25 50 FT
SCALE
N
ATTACHMENT E16
ALLIED TETERBORO FACILITY
ECRA CLEANUP PLAN
EBASCO ENVIRONMENTAL
SOIL BORING LOCATIONS
IN AREA 6
FIGURE 2-4



SOIL BORING LOCATIONS

⊕ ● FS-01	AREA 7	-	FOUNDRY STORAGE AREA
⊕ ● PR-04	AREA S	-	PLANT 4 RECEIVING
⊕ PL-OL	AREA 9	-	PLANT 5 (EAST)
⊕ ● FO-03	AREA 10	-	FUEL OIL STORAGE TANKS
⊕ FS-01	ORIGINAL SOIL BORING LOCATIONS (MARCH 1990)		
●	SUPPLEMENTAL BORING LOCATIONS (JUNE 1990)		

ALLIED TETERBORO FACILITY
ECRA CLEANUP PLAN

EBASCO ENVIRONMENTAL

SOIL BORING LOCATIONS
IN AREAS 7,8,9 AND 10

FIGURE 2-5

ATTACHMENT E17

TABLE 2-2

SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS[1]

	GROUNDWATER UNDER WASTE STORAGE BUILDING, CHEMICAL STORAGE BUILDING, WASTE OIL/SOLVENT STORAGE AND WASTE SOLVENT STORAGE AREA			
Parameter	Minimum Detected Concentration	Maximum Detected Concentration /Location	Mean Detected Concentration	NJAC 7:9-6 Groundwater Standards
Vinyl Chloride	32	20,000/CS-15A-01	460	
Chloroethane	9.1	290/CS-18A-01	48	
Methylene Chloride	2.5	68/OS-01A-01	14	
1,1-Oichloroethene	9.7	1,500/OS-01A-01	21	
1,1-Dichloroethane	14	40,000/CS-16A-01	240	
trans-1,2-Dichloroethene	3.2	170,000/OS-01A-01	330	
1,2-Dichloroethane	8.2	21/CS-16A-01	8.2	
1,1,1-Trichloroethane	110	16,000/OS-01A-01	2,300	
Trichloroethene	2.2	12,000/OS-01A-01	10	
1,1,2-Trichloroethane	8.8	90/OS-01A-01	18	
Benzene	4.2	240/OS-01A-01	40	
Tetrachloroethene	4.7	510/OS-01A-01	70	
Toluene	14	5,500/OS-01A-01	150	
Ethylbenzene	12	780/OS-01A-01	54	
m-Xylene	12	1,800/OS-01A-01	85	
o,p-Xylene	6.4	1,600/OS-01A-01	170	
Chloroform	100	110/OS-01A-01	100	
VOC TICs				
Unknown Compound	5.3	360/CS-05A-01	25	
1,1,2-Trichloro-1,2,2-trifluoroethene	2.4	2,900/OS-01A-01	32	
Substituted cyclic compound	6.4	6.4/CS-18A-01	6.4	
Acetone	89	170/BK-01A-01	110	
1,2-dichloro-1,1,2-trifluoroethane	8.2	1,100/OS-01A-01	63	
Total VOCs	2.2	247,655.2/OS-01A-01	392.9	10
Total TICs	2.5	4157/OS-01A-01	68.3	
Total VOCs & TICs	4.7	251,812.2/OS-01A-01	461.2	

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3931K

TABLE 2-2 (Cont'd)

SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL RESULTS[1]

Semivolatile Organics	GROUNDWATER UNDER WASTE STORAGE BUILDING, CHEMICAL STORAGE BUILDING, WASTE OIL/SOLVENT STORAGE AND WASTE SOLVENT STORAGE AREA Minimum Detected Concentration	Maximum Detected Concentration /Location	Mean Detected Concentration	NJAC 7:9-6 Groundwater Standards
N-Nitrosodiphenylamine	4.6	19/CS-18A-01	14	
Benzidine	2.1	2.1/CS-07A-01	2.1	
2-Methylphenol	5.0	6.9/CS-15A-01	5.0	
4-Methylphenol	24	29/CS-15A-01	25	
2,4-Oimethylphenol	3	3/CS-15A-01D	3	
Naphthalene	2.8	6.7/CS-15A-01D	4.4	
Fluoranthene	2.9	2.9/CS-07A-01	2.9	
Pyrene	2.1	2.1/CS-07A-01	2.1	
Bis(2-ethylhexyl) Phthalate	1.3	46/OS-01A-01	13	
Chrysene	1.9	1.9/CS-07A-01	1.9	
Phenol	120	120/OS-01A-01	120	
4-Chloro-3-methylphenol	7.25	7.25/OS-01A-01	7.25	
BNA TICs				
Unknown Compound	19	702/OS-01A-01	114.8	
Di-methylbenzene Isomer	4.6	690/OS-01A-01	28	
Trimethylbenzene Isomer	66	860/OS-01A-01	90	
Ethylmethylbenzene Isomer	5.2	290/OS-01A-01	19	
Ethylbenzene Isomer	30	1,600/OS-01A-01	39	
Methylbenzene	61	2,000/05-01A-0I	88	
Total BNAs	5.9	377.25/OS-01A-01	23.5	50
Total TICs	19	6142/OS-01A-01	204	
Total BNAs and TICs	7.6	6519.2/OS-01A-01	185.8	
Metals				
Arsenic	7.4	13/OS-01A-01	8.1	50
Chromium	52	52/OS-01A-01	52	50
Silver	20	20/WT-01A-01D	20	50
Mercury	0.56	0.56/WT-01A-01	0.56	2
Zinc	21	34/OS-01A-01	27	

NOTES: (1) Compound concentrations reported in ug/l (ppb)

ATTACHMENT E

3931K

TABLE 2-3 (Sheet 1 of 3)

SUMMARY OF SEDIMENT SAMPLE ANALYTICAL RESULTS[1]

	WESTERN DRAINAGE DITCH			EQUALIZATION DITCH			
Parameter	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration	Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration	NJDEP Soil Action Level
Volatile Organics							
VOC TICs							
Total VOAs and TICs							
Base Neutrals							
Naphthalene	0.28	0.28/WD-01	0.28	12	12/EO-01	12	
Acenaphthene	0.22	0.67/WD-01	0.22	10	10/EO-01	10	
Phenanthrene	2.5	6.3/WD-01	4.3	120	120/EO-01	120	
Anthracene	0.52	1.2/WD-01	0.52	23	23/EO-01	23	
Dibutyl Phthalate	0.81	0.81/WO-01	0.81				
Fluoranthene	0.97	11/WD-04	5.5	170	170/EO-01	170	
Pyrene	3.3	10/WD-04	4.1	160	160/EO-01	160	
Benzo(a)anthracene	2.1	4.9/WD-04	2.1	71	71/EO-01	71	
Bis(2-ethylhexyl)Phthalate	1.4	1.4/WD-03	1.4				
Chrysene	4.0	6.2/WD-01	4.0	100	100/EO-01	100	
Benzo(b)fluoranthene	6.8	12/WD-03	6.8	53	53/EO-01	53	
Benzo(k)fluoranthene	6.8	15/WD-03	6.8	64	64/EO-01	64	
Benzo(a)pyrene	4.5	11/WD-03	4.5	59	59/EO-01	59	
BN TICs							
Unknown Compound	25	65.8/WD-03	25	106	106/EO-01	106	
Trichlorobiphenyl Isomer	384	384/WD-01	384				
Tetrachlorobiphenyl Isomer	1103	1103/WD-01	1103				
Pentachlorobiphenyl Isomer	86	86/WD-01	86				
Total BNs	4.1	57.54/WD-03	16.4	842	842/EO-01	842	
Total BN TICs	25	1628/WD-01	30	242	242/EO-01	242	
Total BNs and TICs	4.1	1652.13/WD-01	46.3	1084	1084/EO-01	1084	+
Metals (ppm)							
Antimony, Total	0.63	2.6/WD-01	1.5				10
Arsenic, Total	3.1	16/WD-04	8.5				20
Cadmium, Total	2.8	16/WD-02	8.5				3
Chromium, Total	10	2,700/WD-02	83				100
Copper, Total	72	3,300/WD-02	200				170
Lead, Total	160	1,100/WD-01D	440				250-1000
Mercury, Total	0.26	1.2/WD-01	0.48				1
Nickel, Total	18	57/WD-02	39				100
Silver	7.4	640/WD-04	40				5
Zinc, Total	340	1,700/WD-02	400				350

ATTACHMENT E-6

SUMMARY OF SEDIMENT SAMPLE ANALYTICAL RESULTS[1]

Parameter	Western Drainage Ditch: Minimum Detected Concentration	Western Drainage Ditch: Haximum Detected Concentration/ Location	Western Drainage Ditch: Mean Detected Concentration	Equalization Ditch: Minimum Detected Concentration	Equalization Ditch: Maximum Detected Concentration/ Location	Equalization Ditch: Mean Detected Concentration	NJDEP Soil Action Level
Polychlorinated Biphenyls							
Aroclor 1248	100	320/WD-01	100				5**
Aroclor 1254	0.52	1.6/WD-04	1.3				5**
Petroleum Hydrocarbons	770	5,300/WD-04	4,500	3,800	3,800/EO-01	3,800	x

NOTE: (1) Compound concentrations are reported in mg/kg (ppm) and presented statistically for all samples collected in each Area
* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil
+ Base Neutrals NJDEP Soil Action Level is 10 ppm total in soil
x Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil unless primarily benzene or PAHs
** Total PCB level

ATTACHMENT E

TABLE 2-3 (Sheet 3 of 3)

SUMMARY OF SEDIMENT SAMPLE ANALYTICAL RESULTS[1]

Volatile Organics	EASTERN DRAINAGE DITCH Minimum Detected Concentration	Maximum Detected Concentration/ Location	Mean Detected Concentration	NJDEP Soil Action Level
Methylene Chloride	0.54	1.2/ED-01	0.56	
VOA TICs				
Unknown Compound	1.4	1.4/ED-01	1.4	
Total VOCs	0.54	1.2/ED-01	0.56	*
Total TICs	1.4	1.4/ED-01	1.4	
TOTAL VOCs and TICs	0.54	2.6/ED-01	0.56	
Metals				
Antimony, Total	0.62	1.6/ED-01	0.73	10
Arsenic, Total	1.4	6.6/ED-03	5.1	20
Cadmium, Total	2.8	3/ED-02	2.8	3
Chromium, Total	19	79/ED-02	69	100
Copper, Total	39	130/ED-03	70	170
Lead, Total	51	280/ED-03	180	250-1000
Mercury, Total	0.46	0.57/ED-02	0.46	1
Nickel, Total	15	30/ED-02	22	100
Silver	4.6	61/ED-03	4.6	5
Zinc, Total	78	410/ED-03	290	350
Petroleum Hydrocarbons	240	2,600/ED-02	2,300	x

NOTE: (1) Compound concentrations are reported in mg/kg (ppm) and presented statistically for all samples collected in each area
* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil
X Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily benzene or PAHs.

ATTACHMENT E2

3931K

TABLE 2-4

ALLIED-SIGNAL AEROSPACE COMPANY SITE
CHEMICAL-SPECIFIC ARARs FOR DETECTED
CONTAMINANTS IN SOIL AND GROUNDWATER

Chemical	NJSOWA (1) MCLS (PPB)	NJAC 7:9-6 (2) GROUNDWATER STANDARDS (PPM)	NJDEP SOIL (3) ACTION LEVEL (PPM)
SOIL			
Antimony			10
Arsenic			20
Cadmium			3
Copper			170
Mercury			1
Nickel			100
Zinc			350
Polycyclic Aromatic Hydrocarbon (PAHs)			10
Polychlorinated Biphenyls (PCBs)			5
Total Base-Neutral Compounds (BNC)			10
Total Petroleum Hydrocarbon (TPH)			1000 (4)
Total Volatile Organic Compounds (VOCs)			1

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3831K

TABLE 2-4 (Cont'd)

ALLIED-SIGNAL AEROSPACE COMPANY SITE
CHEMICAL-SPECIFIC ARARs FOR DETECTED
CONTAMINANTS IN SOIL ANO GROUNDWATER

Chemical	NJSDWA (1) MCL'S (PPB)	NJAC 7:9-6 (2) GROUNDWATER STANDARDS (PPM)	NJDEP SOIL (3) ACTION LEVEL (PPM)
GROUNDWATER			
Cadmium	10	0.01	
Chromium	50 (HEX)	0.05 (HEX)	
Base-Neutral/Acid Extractables (BNAs)		0.05	
Trans-1,2-Oichloroethene	10		
Total Volatile Organic Compounds (VOCs)		0.01	
Vinyl Chloride	2		

NOTES:

(1) Maximum contaminant levels for drinking water. NJ Safe Drinking Water Act and A-280 Amendments NJAC 7:10-16,7A

(2) NJ Water Pollution Control Act Primary Standards for Groundwater Classes GW-1 and GW-2. NJAC 7:9-6.6(A)

(3) To be Determined (TBD) March 1989

(4) NJDEP Directive of December 13, 1990 approved the TPH 1000 ppm action level with PAH plus 15 analyses.

ATTACHMENT E-24

The monitoring well installation and sampling program was focused on the Chemical Storage Area (Area 1), Waste Solvent Tank Area (Area 2) and Waste Oil/Solvent Tank Area (Area 3) where 21 of the soil borings were converted to groundwater monitoring wells as shown in Figure 2-6. One round of groundwater sampling was conducted from all 21 monitoring wells for the analysis of VOCs, BNAs, BNCs, TPH, PPL metals, total dissolved solids (TDS), and pH. Table 2-2 presents the summary of the groundwater samples analytical results with maximum, minimum and mean concentrations of organic compounds and metals in Areas 1, 2 and 3.

A total of 10 sediment samples (five from Area 11, one from Area 12, three from Area 13, and one QA/QC duplicate) were collected throughout Areas 11, 12 and 13. The sediment sampling program for the Western Drainage Ditch was intended to evaluate the impact of past industrial wastewater discharges (outfall 001, 002, 003 and 005). This program was conducted on March 23, 1990 and included the collection of 6 sediment samples (including one field duplicate) from various locations within the channel as shown in Figure 2-7. Each of the samples was analyzed for VOCs, BNCs, PPL metals, TPHs, PDBs and cyanide as shown in Table 2-3.

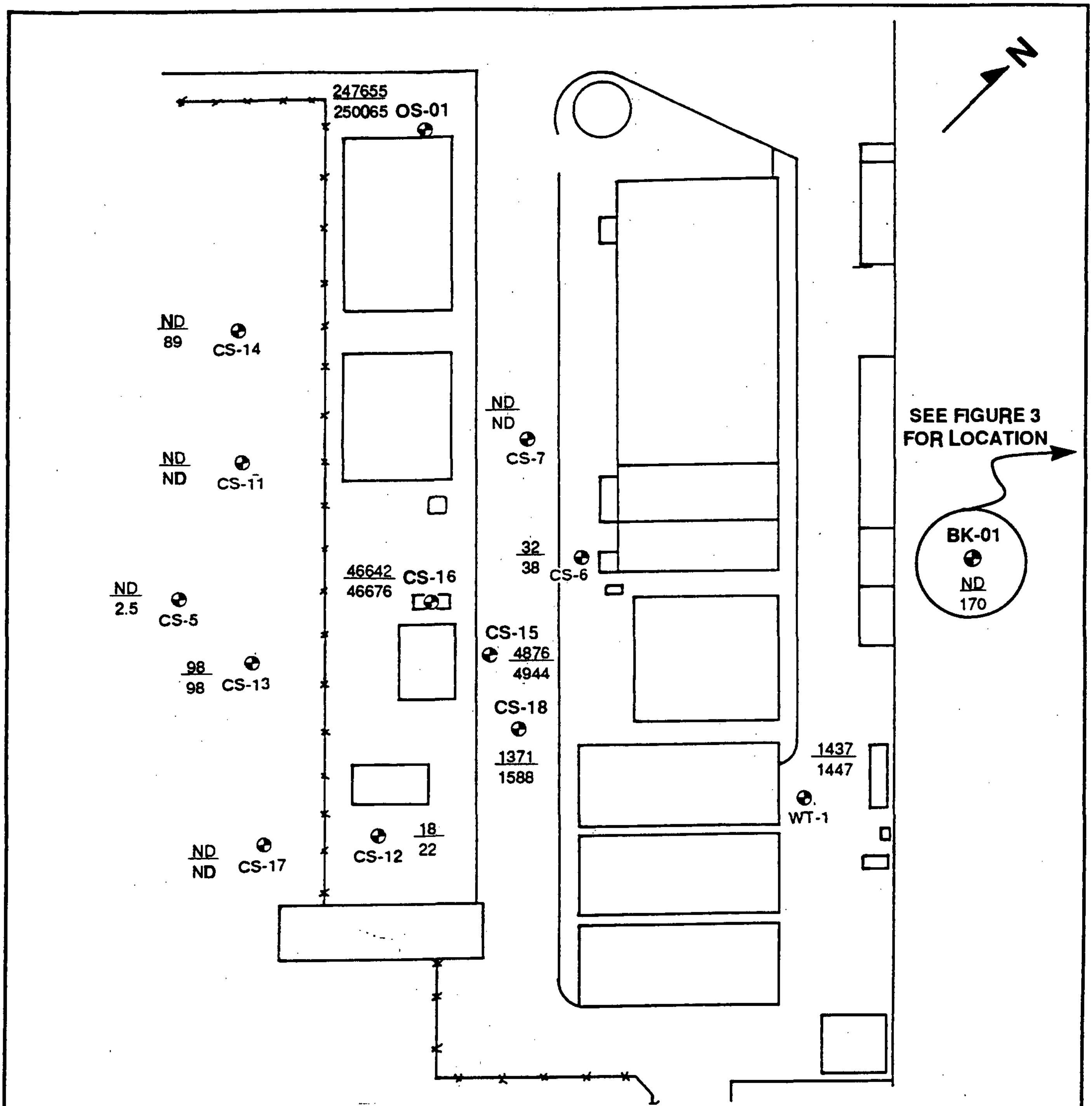
One sediment sample was collected from the extreme western position of the Equalization Ditch as shown in Figure 2-7. The sample analytical results are summarized in Table 2-3. Three sediment samples were collected from the Eastern Drainage Ditch as shown in Figure 2-7. The analytical results for these samples are summarized in Table 2-3. The concentrations of inorganic and semivolatile organic contaminants are shown in Figures 2-8 and 2-9, respectively.

Contamination in the ditches is from an off-site source. Cleanup of the portion of the ditch next to the Allied Facility would not significantly improve the quality of the streams, since documented upgradient contamination in the ditches and from surrounding off-site soils would quickly recontaminate the portion of the ditches crossing the Allied property. Sediments in the Equalization Ditch are transported from the Eastern and Western Drainage channels as flbw equalizes in the two ditches. If sediments in the Equalization Ditch were removed it would quickly silt up with contaminated off-site materials again. The sources of contaminated materials in the Equalization Ditch are off-site sediments such as those transported from the Great Bear Oil Spills. Therefore, the cleanup of the Western Ditch (Area 11), Equalization Ditch (Area 12) and Eastern Ditch (Area 13) within Allied's property would not be proposed in this Cleanup Plan.

2.2 NATURE AND EXTENT OF CONTAMINATION

The nature and extent of soil and groundwater contamination in the Teterboro Facility was defined by the analytical sampling results (Table 2-1, 2-2 and 2-3) and chemical-specific Applicable, Relevant and Appropriate Requirements (ARARs) as shown in Table 2-4. The chemical-specific ARARs include NJDEP Soil Action Levels for contaminated soil and NJ Maximum Contaminant Levels for Drinking Water (NJ Safe Drinking Water Act and A-280 Amendments (NJAC 7:10-16, 7A) as well as NJ Water Pollution Control Act Primary Standards for Groundwater Classes GW-1 and GW-2 (NJAC 7:9-6.6A) for groundwater contamination). In addition, any isolated detections of contaminants were not considered representative of additional site contamination.

Analytical results for compounds present above NJDEP action levels are presented on Plates 1 and 2, folded in plastic pockets at the back of this report.



VOLATILE ORGANIC COMPOUND CONCENTRATIONS

18 / 22	VOCs (ppb) / VOCs + TICs (ppb)
ND	NOT DETECTED

25 0 50 100 FT

SCALE

MONITORING WELL LOCATION & NUMBER

CS-5 AREA 1- CHEMICAL STORAGE AREA

WT-1 AREA 2- WASTE SOLVENT TANKS

OS-1 AREA 3- WASTE OIL/SOLVENT TANKS

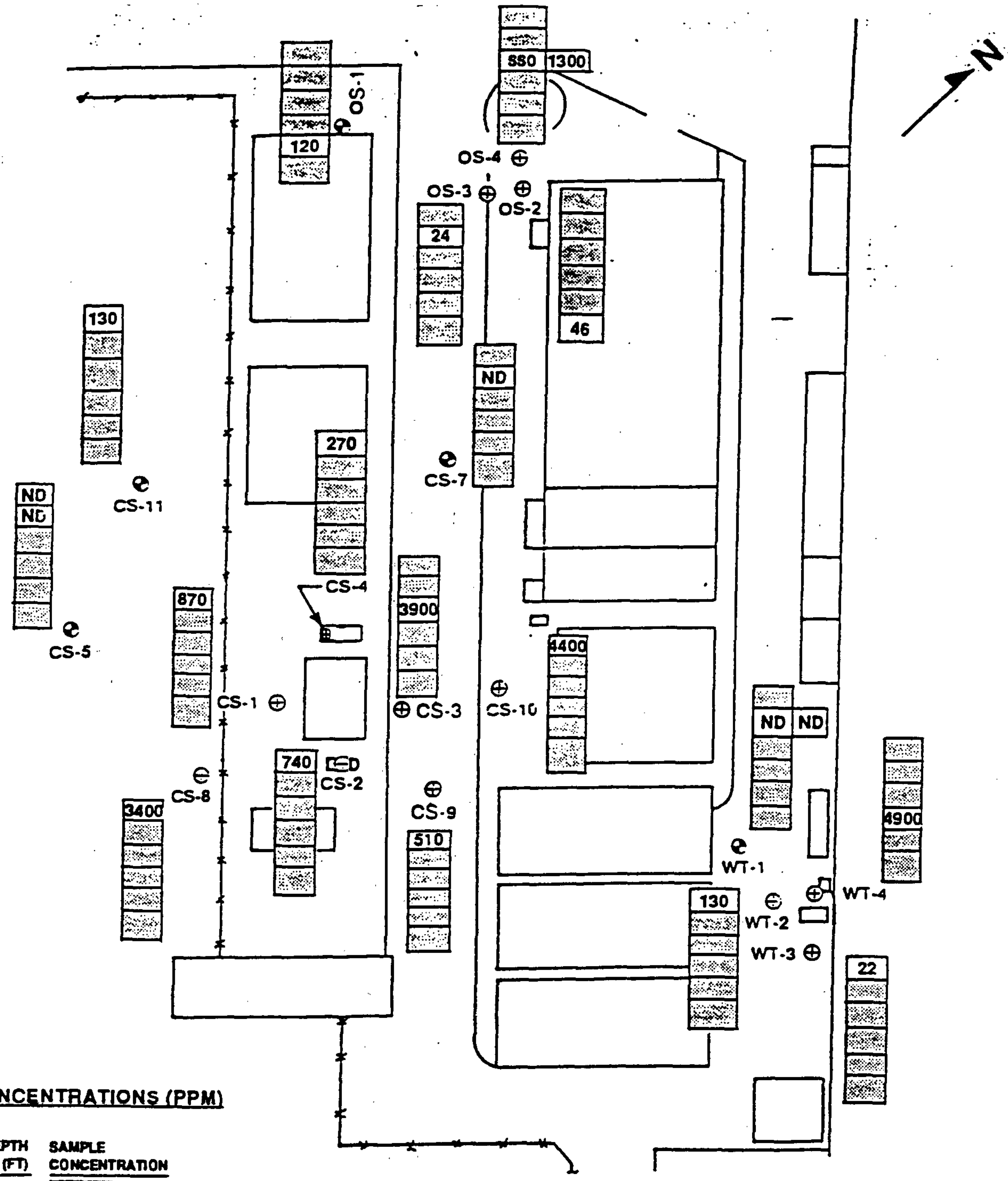
ALLIED TETERBORO FACILITY
ECRA CLEANUP PLAN

EBASCO ENVIRONMENTAL

MARCH,1990
VOLATILE ORGANIC
COMPOUND CONCENTRATIONS
IN GROUNDWATER

FIGURE 2-11

ATTACHMENT E-27



TPH CONCENTRATIONS (PPM)

DEPTH (FT)	SAMPLE CONCENTRATION		
0-2	120		
2-4	3400	ND	(DUPLICATE)
4-6			
6-8			
S-10			
10-12			

ND TPHs NOT DETECTED

TPH s NOT ANALYZED

CS-5 SOIL BORING LOCATION & NUMBER

SOIL BORING CONVERTED TO MONITORING WELL

25 0 50 100 FT

SCALE

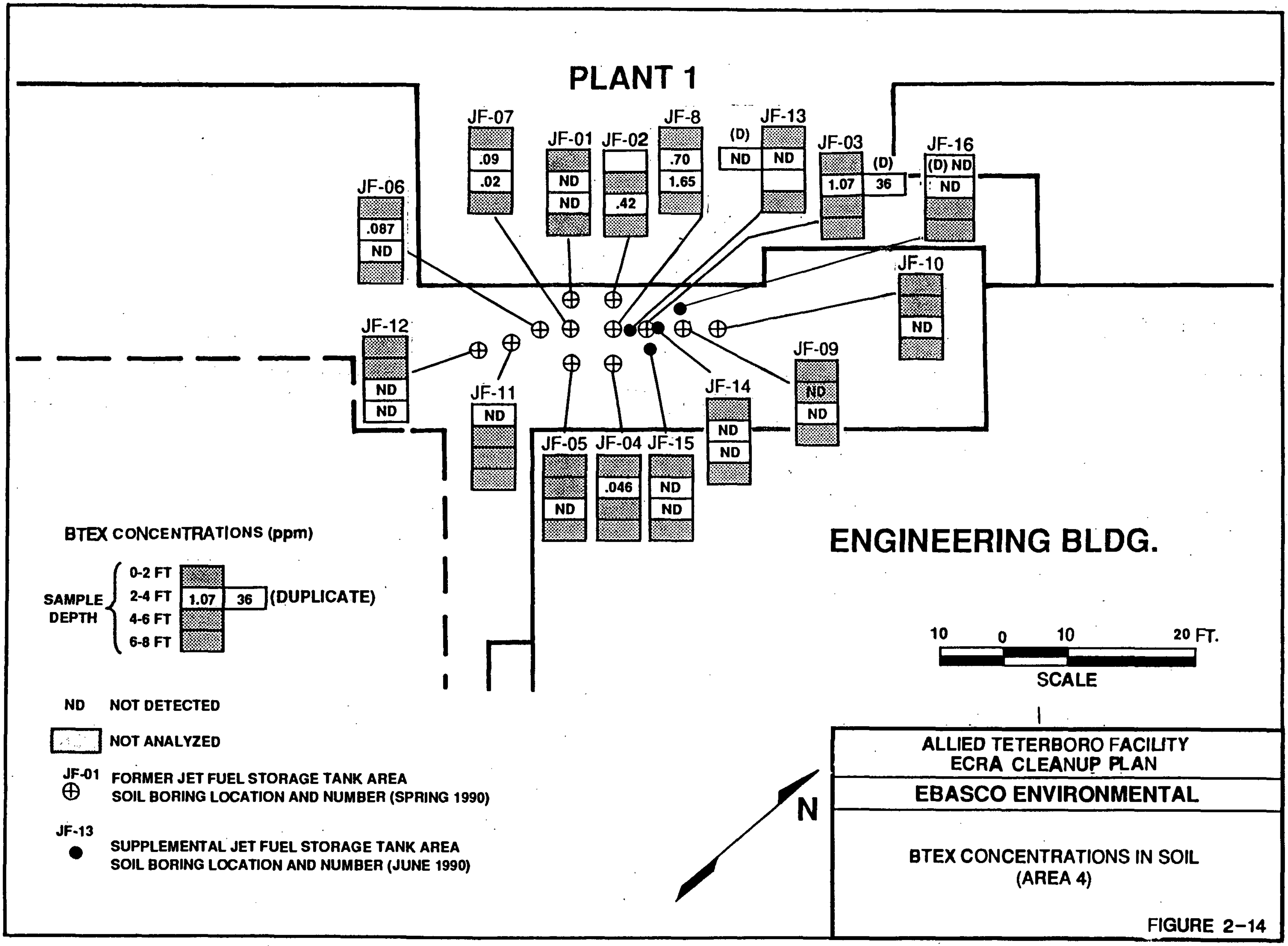
ALLIED TETERBORO FACILITY
ECRA CLEANUP PLAN

EBASCO ENVIRONMENTAL

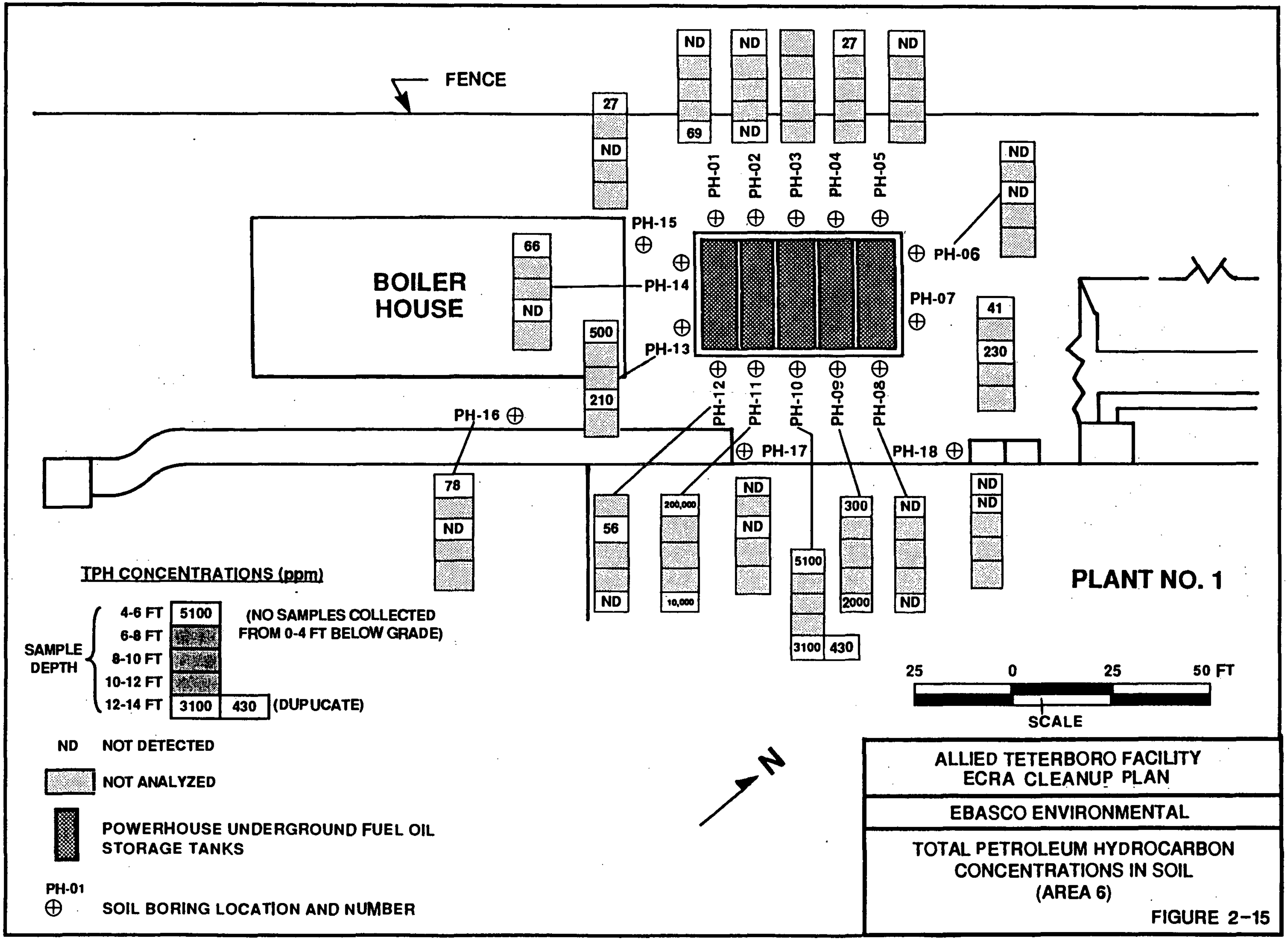
TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL (AREA 1, 2, 3, AND 5)

ATTACHMENT E28

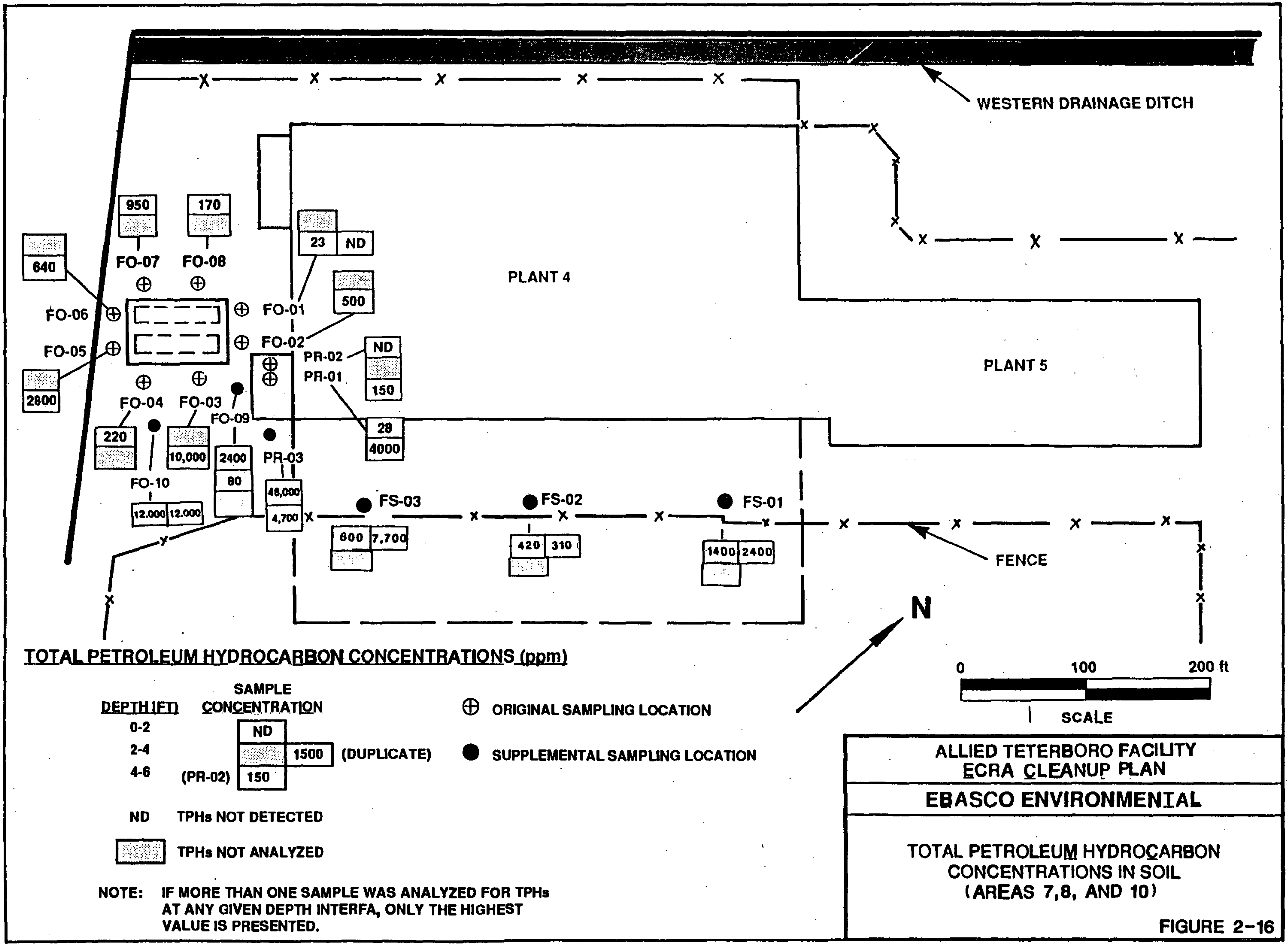
FIGURE 2-13



ATTACHMENT E29



ATTACHMENT E30 -



ATTACHMENT E31

TABLE 2-5

ALLIED-SIGNAL AEROSPACE COMPANY SITE
NATURE AND EXTENT OF CONTAMINATION

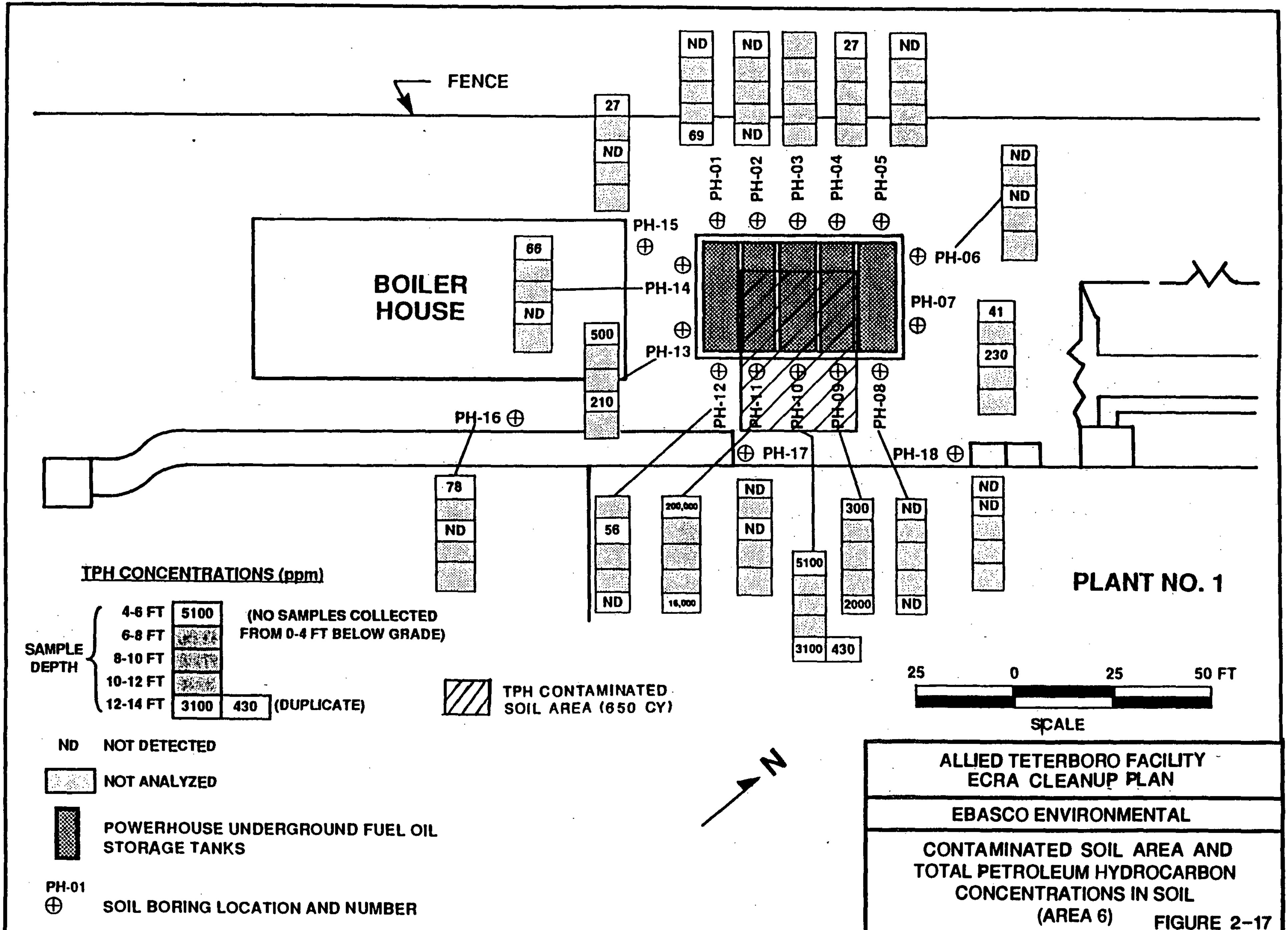
I. SOIL CONTAMINATION

AREA	ESTIMATED	CONTAMINANT
1. Powerhouse Fuel Storage Tank Area	35' x 25' x 14' = 453 cy 35' x 25' x (14'-8') = 197 cy Total 650 cy	Total Petroleum Hydrocarbon (TPH) (1000 - 200,000 ppm) PAHs (10-37.4 ppm)
2. Fuel Oil Storage Tank Area and Plant 4 Receiving Area (Areas 8 & 10)	12,000 ft^2x4' = 1,780 cy	TPH (1,000-46,000 ppm) BNC (10-300 ppm)

II. SOIL AND GROUNDWATER CONTAMINATION

AREA	ESTIMATED	CONTAMINANT
1. Area Consisting of Hazardous Waste Storage Building Chemical Storage Building Waste Oil/Solvent Storage Area Waste Solvent Storage Tank Area (Areas 1, 2 and 3)	Isolated Hot-Spots Soils	Total VOCs (10-2,200 ppm) PAHs (10-70 ppm) Cd (3-37 ppm) Cu (170-180 ppm) Hg (1-38 ppm)
	4.0 x 10^6 Gal Contaminated Groundwater Plume	Total VOCs (10-247,600 ppb) Trans-1,2-Dichloroethene (10-170,000 ppb) Vinyl Chloride (2-20,000 ppb) Base-Neutrals/Acid Extractables (50-380 ppb)

ATTACHMENT E32



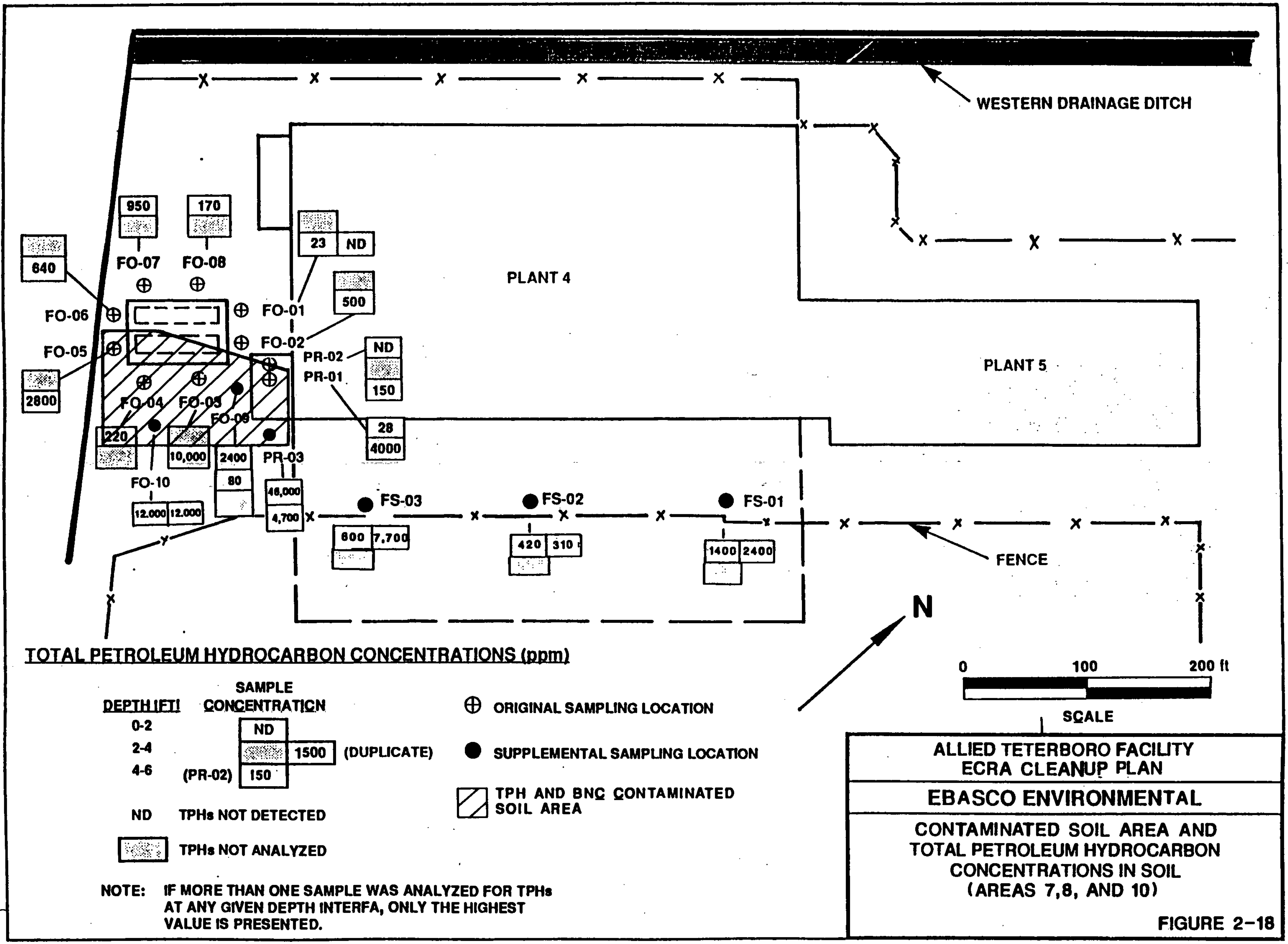
ALLIED TETERBORO FACILITY
ECRA CLEANUP PLAN

EBASCO ENVIRONMENTAL

CONTAMINATED SOIL AREA AND TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL (AREA 6)

FIGURE 2-17

ATTACHMENT E33



ATTACHMENT E34

Figures 2-10, 2-11, 2-12 and 2-13 present the VOC concentrations in soil and groundwater for Areas 1, 2 and 3. Figure 2-14 presents BTEX concentrations in soil for Area 4. Figure 2-15 presents TPH concentrations in soil for Area 6, and Figure 2-16 presents TPH concentrations in soil for Areas 7, 8 and 10.

Table 2-5 presents the areas, estimated quantities and contaminants to be addressed in the Cleanup Plan and be briefly discussed below. More details are presented in Section 6.0 - Conclusions and Recommendations of the Field Sampling Plan Results Report.

Soil Contamination

Area 6, Powerhouse Fuel Oil Storage Tanks, has a contaminated area of approximately 35 ft x 25 ft for a depth of approximately 14 feet outside the tank farm and a contaminated area of approximately 35 ft x 25 ft for a depth of approximately 6 feet under the tanks as shown in Figure 2-17. A total of approximately 650 cubic yards of soil was contaminated with TPH in the range of 1000 to 200,000 mg/kg and PAHs in the range of 10 to 37.4 mg/kg. The tank replacement is currently planned for the summer of 1991. The Cleanup Plan to excavate and remove the TPH-contaminated soil will be implemented in conjunction with tank removal and replacement. A site-specific TPH action level of 1000 ppm is recommended for this area due to the widespread occurrence of TPHs at the Facility. This Cleanup Plan may be executed separately from other cleanup plans to facilitate this process.

Area 8, Plant Four Storage Area, and Area 10, Fuel Oil Storage Tank, have an area of approximately 12,000 ft^2 by 4 ft depth contaminated with TPH in the range of 1000 to 46,000 mg/kg and BNC in range of 10 to 300 mg/kg. A total of 1,780 cubic yards of TPH contaminated soil would require remedy as shown in Figure 2-18.

Soil and Groundwater Contamination

Area 1, Chemical Storage Area, has a limited areal extent of VOCs and BNCs contamination slightly above the soil action levels. Cadmium (max. 27 ppm), copper (max. 180 ppm) and mercury (max. 38 ppm) were also detected in the soil at concentration above action levels in isolated samples. TPHs were also detected in the soil which appear to be attributed to the ubiquitous presence of near surface oil stained soil. The contaminants in the groundwater are primarily of VOCs (max. 46,641 ppb) including vinyl chloride, 1-1-dichloroethane and trans-1,2-dichloroethene. The detected groundwater contamination was centered around Wells CS-15 and CS-16 (Figure 2-6).

Area 2, Waste Solvent Storage Tank, has one isolated sample (WT-04) with trichloroethene, tetrachloroethene and 1, 1, 1-trichloroethene at concentrations above the action levels. TPHs were found above the action level in two soil samples collected from this area. A water sample from WT-01 (Figure 2-11) had elevated levels of VOCs (max. 1437 ppm), even though the soil sample at this location did not. Vinyl chloride (max. 680 ppb), 1,1-dichloroethane (max. 140 ppb) and trans-1,2-dichloroethene (max. 640 ppb) were each detected at elevated levels in the wells.

Area 3, Waste Oil/Solvent Storage Tank, has only two soil samples from borings OS-02 and OS-04 which exhibit elevated levels of toluene, ethylbenzene and xylene at a depth of 10 to 10.5 feet and 4 to 4.5 feet, respectively. TPHs were detected in soil samples OS-01 (max. 120 ppm) and OS-04 (1,300 ppm) above action level (100 mg/kg). Compounds detected with the largest concentrations included: 1,1,1-trichloroethene (0.53-1.6 ppm), m-xylene (0.33-37 ppm), tetrachloroethene (0.063-4.7 ppm), o,p-xylene (5.3-25 ppm) and toluene (0.69-19 ppm). VOCs contamination was not detected in boring OS-01; however, the water sample from the well installed at that location contained

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the highest level of VOCs (250,065 ppb) measured in any water sample from the site, including trans-1,2-dichloroethene and vinylchloride detected at 180,000 ppb and 20,000 ppb, respectively.

In Area 5, Hazardous Waste Storage Area, several soil samples detected metals (antimony, arsenic, beryllium, copper, mercury, nickel and zinc) and VOCs at levels above action levels (metals at CP-025-01 and tetrachloroethene at CP-0-35-02). The groundwater at this area downgradient from the Waste Oil/Solvent Tank (Area 3) is considered to be contaminated by VOCs.

As shown in Figures 2-19 and 2-20 and Table 2-5, the contaminated groundwater plume can be defined in an area of 250 ft by 500 ft encompassed by Areas 1, 2, 3 and 5. The primary contaminants in this 5-foot deep shallow aquifer which is above the thick clay layer are VOCs including trahs-1,2-dichloroethene (10 to 180,000 ppb), vinyl chloride (2 to 20,000 ppb) and base-neutrals/acid extractables (50 to 380 ppb). The volume of the contaminated groundwater plume is estimated at 4×10^6 gallons. Figures 2-10, 2-11, 2-12 and 2-13 present the concentrations of volatile organics, semi-volatile organics and TPH in soil and groundwater.

The above discussed soil contaminations indicate very limited metals and VOCs contamination or isolated "hits" scattered in the unsaturated zone (1 to 2 feet) above the contaminated groundwater area. Due to the fact that the area is either paved or covered by buildings, a combined soil and groundwater remediation program such as in-situ soil flushing would be appropriate. The proposed cleanup method (GHEA Process with surfactant extraction) is capable of removing metals, VOCs, BNC and TPH contaminants in compliance with ARARs.

The monitoring well installation and sampling program was focused on the Chemical Storage Area (Area 1), Waste Solvent Tank Area (Area 2) and Waste Oil/Solvent Tank Area (Area 3) where 21 of the soil borings were converted to groundwater monitoring wells as shown in Figure 2-6. One round of groundwater sampling was conducted from all 21 monitoring wells for the analysis of VOCs, BNAs, BNCs, TPH, PPL metals, total dissolved solids (TDS), and pH. Table 2-2 presents the summary of the groundwater samples analytical results with maximum, minimum and mean concentrations of organic compounds and metals in Areas 1, 2 and 3.

A total of 10 sediment samples (five from Area 11, one from Area 12, three from Area 13, and one QA/QC duplicate) were collected throughout Areas 11, 12 and 13. The sediment sampling program for the Western Drainage Ditch was intended to evaluate the impact of past industrial wastewater discharges (outfall 001, 002, 003 and 005). This program was conducted on March 23, 1990 and included the collection of 6 sediment samples (including one field duplicate) from various locations within the channel as shown in Figure 2-7. Each of the samples was analyzed for VOCs, BNCs, PPL metals, TPHs, PDBs and cyanide as shown in Table 2-3.

One sediment sample was collected from the extreme western position of the Equalization Ditch as shown in Figure 2-7. The sample analytical results are summarized in Table 2-3. Three sediment samples were collected from the Eastern Drainage Ditch as shown in Figure 2-7. The analytical results for these samples are summarized in Table 2-3. The concentrations of inorganic and semivolatile organic contaminants are shown in Figures 2-8 and 2-9, respectively.

3.0 PROPOSED REMEDIAL ACTIONS

3.1 REMEDIAL ALTERNATIVES SCREENING AND EVALUATIONS

3.1.1 Remedial Technology Screening

Table 3-1 identifies the conventional and innovative treatment and disposal technologies applicable for petroleum hydrocarbon (TPH) contaminated soil. Table 3-2 identifies the conventional and PAHs, VOCs, and metals innovative treatment technologies applicable for volatile organic, semi-volatile organic and metals contaminated groundwater. Table 3-3 presents the technical screening of the potentially applicable treatment technologies proposed by the New Jersey Institute of Technology for the contaminated soil and groundwater including GHEA Process (chemical extraction with surfactant) for both contaminated soil and groundwater, Microwave Treatment and Composting for contaminated soil.

The results of the technical screening are summarized below:

1. Off-site recycling of petroleum contaminated soil and on-site treatment by the GHEA Process are considered to be feasible for the TPH and PAHs contaminated soil in the Powerhouse Fuel Oil Storage Area (Area 6).

2. Off-site sanitary landfill and GHEA Process treatment are considered feasible for the TPH contaminated soil and potentially contaminated groundwater in the Fuel Oil Storage Tank (Area 8) and Plant 4 Receiving Area (Area 10).

3. Air stripping, carbon adsorption and GHEA process treatment are feasible for volatile and semi-volatile organic and metals contaminated groundwater in Areas 1, 2, 3 and 5.

Since the GHEA process is considered to be the most suitable innovative technology for both contaminated soil and groundwater, a technical evaluation was performed and is presented in Table 3-4 based on the criteria of effectiveness, implementability and cost.

3.1.2 Remedial Alternatives Evaluation

The two most feasible remedial alternatives were developed for both soil and groundwater contaminated areas. Each remedial alternative was technically evaluated and the associated implementation duration and costs (capital cost and operation/maintenance cost if applicable) determined and a preferred alternative was identified as the results of this evaluation. Tables 3-5 and 3-6 present the remedial alternative evaluation for Areas 6, 8 and 10. Table 3-7 presents the remedial alternative evaluation for the contaminated groundwater area consisting of Areas 1, 2, 3 and 5.

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TABLE 3-5

REMEDIAL ALTERNATIVE EVALUATION
POWERHOUSE FUEL OIL STORAGE TANK AREA

I. NATURE AND EXTENT OF CONTAMINATION

1. Assume fuel oil storage tanks will be removed.

2. Volume of soil contaminated with TPH (max 200,000 mg/kg) and PAHs (max 38 mg/kg), approximately 650 cy.

3. Assume contaminated soil would not be classified as ID-27 due to TPH greater than 30,000 mg/kg.

II. REMEDIAL ALTERNATIVES

1. ALTERNATIVE I - Excavation, off-site petroleum contaminated soil recycling (S&M Waste Oil, Inc) backfill with clean soil.

2. ALTERNATIVE II - Excavation, on-site GHEA process (soil decontamination by surfactant extraction), treated soil redeposition.

III. TECHNICAL EVALUATION

	ALTERNATIVE I		ALTERNATIVE II
1.	Dewatering and blending are required	1.	No dewatering and blending are required
2.	Negative traffic impact due to off-site transportation	2.	Traffic impacts are limited to plant area
3.	Cost will be increased significantly for soil with TPH higher thaN 1,000 mg/kg. Stockpiling will be required to permit blending to achieve acceptable concentration	3.	GHEA process system for groundwater can also be used for soil washing
4.	Hazardous waste transportation manifest application is required	4.	No permit application would be required
5.	No further liability problems	5.	Treated soil is back-filled on-site and liability is not eliminated
6.	Max removal rate 1,000 ton/day	6.	Max treatment rate 20 ton/day

TABLE 3-5 (Cont'd)

REMEDIAL ALTERNATIVE EVALUATION
POWERHOUSE FUEL OIL STORAGE TANK AREA

IV. IMPLEMENTATION DURATION

1. ALTERNATIVE I - 1 to 2 weeks

2. ALTERNATIVE II - 2 months (after GHEA process system is fabricated and installed)

V. COST (Accuracy + 50%, -30%)

		ALTERNATIVE I	ALTERNATIVE II
1.	Capital Cost	$ 195,000	$ 112,500
2.	Operation/Maintenance Cost	0	0

VI. RECOMMENDATION

ALTERNATIVE I is preferred because the contaminated soil removal, treatment and disposal have to be completed after the replacement of the fuel oil storage tanks to prevent any further contamination. The use of the GHEA Process system for soil treatment in conjunction with groundwater treatment cannot meet the schedule requirements.

TABLE 3-6

REMEDIAL ALTERNATIVE EVALUATION
FUEL OIL STORAGE TANK AREA AND
PLANT 4 RECEIVING AREA

I. NATURE AND EXTENT OF CONTAMINATION

A. Soil contaminated with TPH (max 10,000 mg/kg) for a total of 1,780 cy

B. Contaminated soil can be classified as NJ WASTE ID-27 due to TPH lower than 30,000 mg/kg

II. REMEDIAL ALTERNATIVES

1. ALTERNATIVE I - Excavation, off-site disposal at sanitary landfill, clean soil backfill

2. ALTERNATIVE II - Slurry wall, well-point extraction system, GHEA process system (joint treatment with groundwater treatment system), French drain trench reinjection system.

Ill. TECHNICAL EVALUATION

ALTERNATIVE I	ALTERNATIVE II
1. Application for NJDEP Waste classification and municipal landfill permit is required	1. No separate permit application is required
2. Intensive soil sampling is required	2. One system will handle both contaminated soil and groundwater
3. No impact on soil bearing capacity	3. Only monitoring samples are required
	4. Potential reduction of soil bearing capacity in saturated area
4. Potential interference with plant operation	5. Minimal interference with plant operation

IV. IMPLEMENTATION

ALTERNATIVE 1 - 9 Months
ALTERNATIVE II - 10 Years

TABLE 3-6 (Cont'd)

REMEDIAL ALTERNATIVE EVALUATION
FUEL OIL STORAGE TANK AREA AND
PLANT 4 RECEIVING AREA

V. COST (Accuracy + 50%, - 30%)

		ALTERNATIVE I	ALTERNATIVE II
1.	Capital Cost	$540,000	$226,000
2.	Annual Operation/Maintenance Cost	0	$ 37,000/YR
3.	Present Worth (10% Interest)	$540,000	$453,000/10 YRS

VI. RECOMMENDATION

ALTERNATIVE II is preferred.

TABLE 3-7

REMEDIAL ALTERNATIVE EVALUATION
GROUNDWATER AND SOIL CONTAMINATION AREAS 1, 2, 3 AND 5

I. NATURE AND EXTENT OF CONTAMINATION

1. Contaminants - Total VOCs (max 250 _Mg/l) Trans 1,2-Dichloroethene (max 170 Mg/l) Vinyl Chloride (max 20 Mg/l), Semi-Volatile Organics (max 0.4 Mg/l) in groundwater. Isolated hot-spot soils contaminated with VOCs (max 2,200 ppm), PAHs (max 70 ppm), Cd (max 37 ppm), and Hg (max 38 ppm).

2. Contaminated Plume - Approximately 4 x 10^6 Gal

II. REMEDIAL ALTERNATIVES

1. ALTERNATIVE I - Slurry Wall, French Drain Trench Extraction System, Chemical Coagulation/ Precipitation, Air Stripping, Carbon Adsorption, French Drain Trench Reinjection System

2. ALTERNATIVE II - Slurry Wall, Well-Point Extraction System, GHEA Process (Surfactant Extraction), French Drain Trench Reinjection System

III. TECHNICAL EVALUATION

ALTERNATIVE I	ALTERNATIVE II
1. No treatability study required	1. Treatability studies are required for GHEA process
2. Using water flushing requires an estimated 30 years at 25 GPM flow rate	2. Significant reduction of operation time due to the use of surfactant extraction and pressurized groundwater extraction system (assume 10 years at 25 GPM)
3. All equipment/facility is commercially available	3. GHEA process requires specific design and fabrication, but utilizes commercially available components and materials.
4. Conventional technologies	4. Innovative technologies (i,e, not commercially available)

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TABLE 3-7 (Cont'd)

REMEDIAL ALTERNATIVE EVALUATION
GROUNDWATER CONTAMINATION AREA

IV. IMPLEMENTATION DURATION

		ALTERNATIVE I	ALTERNATIVE II
1.	Remedial Design/Construction	1 year	_ 2 years
2.	Pump/Treatment Operation	30 years	10 years
V.	Cost (Accuracy + 50%, - 30%)		
1.	Capital Cost	$ 532,000	$540,000
2.	Operation/Maintenance Cost	$ 190,000/yr	$131,000/yr
3.	Present Worth (10% Interest)	$2,323,000/30 yrs	$1,344,000/10 yrs

NOTE: If the excavated soil from the French drain trench (800 cy) is hazardous waste, an additional $300,000 is required for on-site low temperature soil stripping or GHEA Process treatment.

VI. RECOMMENDATION

ALTERNATIVE II is preferred.

Based on the above remedial alternative evaluation, the preferred remedial alternative and associated rationales are summarized below. The remedial acticns proposed for each contaminated area are discussed in detail in Section 3.2.

	Contaminated Area	Preferred Remedial Alternative	Rationales of Preference
1.	Area 6 - Powerhouse Fuel Oil Storage Tank Area	Alternative I - Off-Site Petroleum Contaminated Soil Recycling	Contaminated soil has to be removed immediately following the removal of the tank and cannot depend upon the completion of the GHEA process system.
2.	Areas 8 and 10 - Fuel Oil Storage Tank Area and Plant 4 Receiving Area	Alternative II - Slurry Wall, Well-Point Extraction System, GHEA Process System and French Drain Trench Reinjection	GHEA process can expedite in-situ soil flushing for both contaminated unsaturated soil and shallow aquifer. Joint treatment with Areas 1, 2, 3 and 5 is feasible.
3.	Areas 1, 2, 3 and 5 - Contaminated Groundwater Plume	Alternative II - Slurry Wall, Well-Point Extraction System GHEA Process System and French Drain Reinjection System	GHEA process can expedite in-situ soil flushing for both contaminated soil and shallow aquifer.

3.2 PROPOSED REMEDIAL ACTIONS

Powerhouse Fuel Oil Storage Tank (Area 6)

In Area 6, approximately 450 cubic yards and 200 cubic yards, respectively, of petroleum hydrocarbon contaminated soils would be excavated from the hot spots between the tank farm and the building, and beneath the tank farm (Figure 2-17). The excavated soils would be transported to an off-site fully permitted recycling facility which has a process capacity of approximately 1,000 tons per day. Sampling of contaminated soil for Vendor's acceptance is required prior to recycling. The soils are sample tested and a certification statement is required, certifying this waste material as non-hazardous. On-site soil dewatering and blending may be required prior to off-site transportation. It is expected that the blended soil would contain TPH around 2,000 ppm level and PAHs below 5 ppm level. The excavated area will be backfilled with clean soil, graded, and seeded to establish a vegetative (grass) cover.

The petroleum hydrocarbon contaminated soil recycling processes involve an initial screening and crushing operation to remove debris and break up large rock. The soil is then fired, mixed with limestone and finally coated with asphalt. The end product is an asphalt mix which provides an excellent coarse base. This recycling provides an alternative to landfilling, which greatly reduces the generator liability at a competitive price. This remedial alternative could be implemented in one week.

Since the blended soil would contain TPH higher than 1,000 ppm (at approximately $100/ton for petroleum contaminated soil recycling), it is estimated that a unit cost of $250/cy would be required to recycle the contaminated soil with TPH around 2,000 ppm. Information related to the S&M Waste Oil, Inc., is presented in Appendix A.

Fuel Oil Storage Tank Area and Plant 4 Receiving Area (Area 8/10)

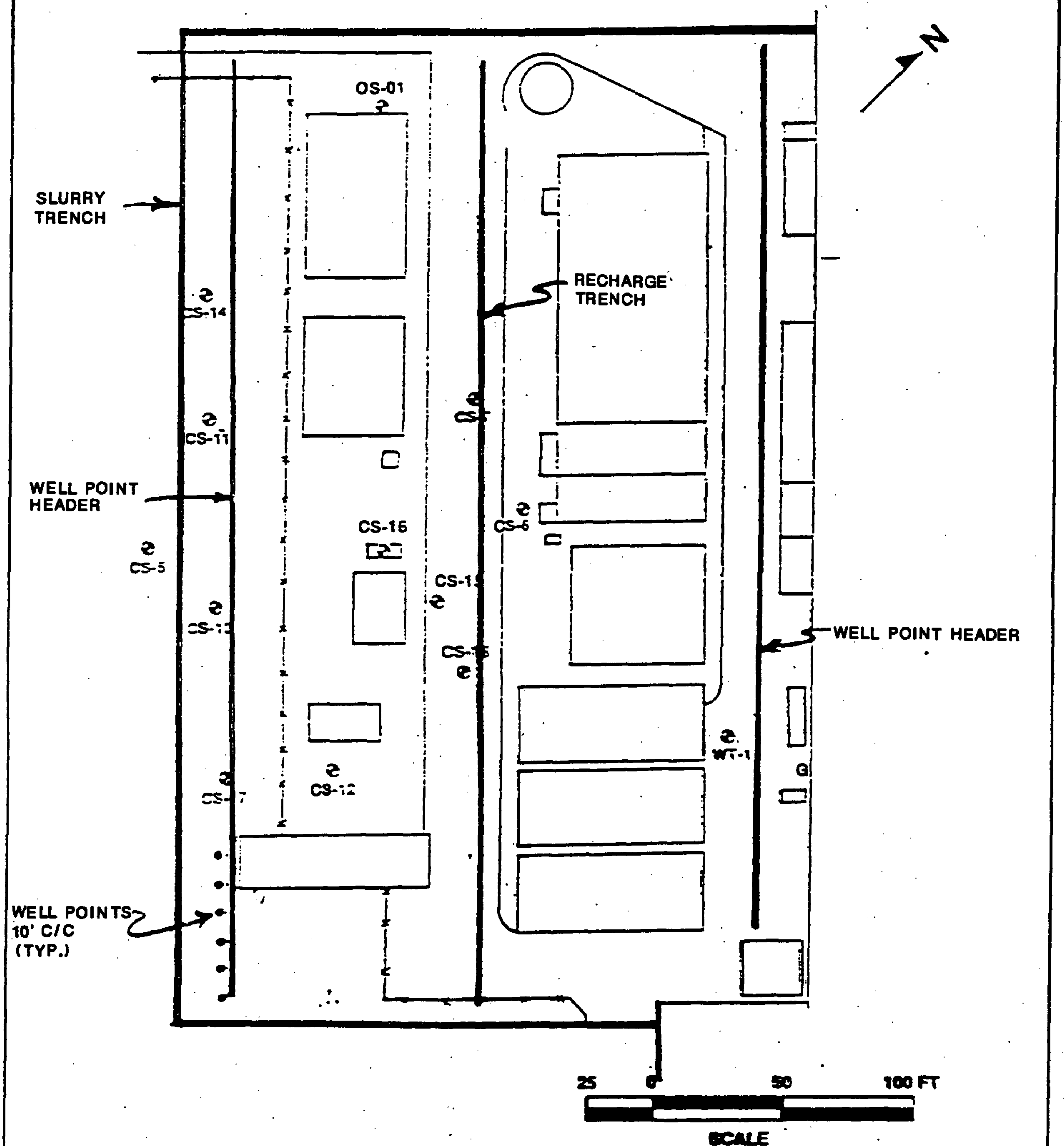
In situ soil flushing would entail active hydraulic injection/extraction of a surfactant and water mixture to flush petroleum hydrocarbon compounds from the contaminated soil through the shallow aquifer (4 to 5 ft above the existing clay layer). The soil flushing would be done in conjunction with the groundwater pump and treatment for a combined treatment of the two media. The in situ flushing area of approximately 12,000 ft^2 would be contained with a slurry wall vertical barrier keyed into the underlying clay layer. A well-point extraction system and a French Drain Trench system would be installed for the soil leachate extraction and surfactant/water reinjection. Approximately 5 gpm of groundwater would be extracted and transferred to the groundwater pump and treatment system (located in Areas 1, 2, 3 and 5) for joint treatment and reinjection. The ongoing soil column leachate study and system effectiveness for the groundwater pump and treatment alternative to be applied in Areas 1, 2, 3 and 5 are applicable to this contaminated area.

The hydraulic water flushing would have similar mechanisms of TPH removal as the mechanical soil washing with water but would require a long-term effort. However, since a surfactant and well-point extraction and reinjection would be used as part of the GHEA process, the target levels for removal of TPH from the soil should be achieved within a reasonable expedited time.

Contaminated Soil and Groundwater Plume (Areas 1, 2, 3 and 5)

The proposed groundwater pump and treatment system would consist of four elements: a slurry trench, a well-point extraction system, the GHEA process treatment, and a recharge trench. As shown in Figure 3-1 the installation of approximately 1,000 linear ft of soil bentonite slurry trench around the contaminated groundwater area is intended to stop groundwater in-flow into the contamination zone thereby minimizing the pumping and treatment quantity. In addition, the slurry wall containment would raise the groundwater table for in-situ soil flushing in the vadose zone where scattered areas of unsaturated soils were found to be contaminated with VOCs, PAHs and metals.

A conceptual sketch of the slurry trench, well-point extraction system and French drain recharge trench is shown in Figure 3-1. In the area of contaminated groundwater plume, the slurry trench would be installed to the wall of the building, but will only encompass three sides because the north side consists of a building foundation footing keyed into the clay layer. The slurry trench would be keyed into the underlying clay layer at a total depth of approximately 8 to 10 ft.



ALLIED TETERBORO FACILITY
ECRA CLEANUP PLAN

EBASCO ENVIRONMENTAL

GENERAL PLAN OF SLURRY WALL,
WELL POINT EXTRACTION SYSTEM
AND FRENCH DRAIN RECHARGE TRENCH

FIGURE 3-1

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Two well-point pumping lines with well-points approximately 10 ft on center would be installed within the area encompassed by the slurry wall. The wellpoint collection header would be buried below the frost line. A valve box would be placed at each well-point to provide access to the valve for turning and maintenance purposes. The well-point would be installed to a depth of approximately 10 to 12 ft and would be socketed into the clay layer. The header would be connected to an electrically operated low volume well-point pump.

The french drain reinjection trench would consist of an excavated trench approximately 3 ft deep that would be backfilled with clean gravel and a 6-inch perforated pipe extending over the entire length of the recharge trench. The well-point discharge would be piped to an on-site GHEA process treatment plant.

The GHEA process employs both ionic and nonionic surfactants for solubilization of organic and heavy metal compounds in water. The surfactants are biodegradable, environmentally acceptable agents. The contaminant laden water is purified by ultrafiltration followed by air flotation. The surfactant used for solubilization is fully recovered for repeated use. The contaminant fraction is isolated as a concentrate (tar) which in this case would be treated and disposed of off-site. The treated water would be mixed with surfactant and reinjected into the contamination zone for in situ soil flushing.

As shown in Figure 3-2, the extracted groundwater is treated by a combined ultrafiltration/air flotation process to remove the residual surfactant and solute contents. Metal solutes are separated out of solution in the air flotation step under controlled alkaline conditions in the range of $7<pH<11$. Separation of organics from the surfactant is performed by extraction of the surfactant/solute complex with an organic solvent, such as hexane. The extraction is followed by

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distillation of the raffinate to separate out and recover the residual solvent. Separation of metals from the surfactant is performed by addition of alkali, such as NaOH, to obtain a pH in the range of 8 to 11, and skimming off the metal hydroxides. The treated surfactant phase is then returned to the process for repeated use.

The soil and water decontamination by extraction with surfactants has been developed by Dr. Itzak Gotlieb in collaboration with the New Jersey Institute of Technology (NJIT). The surfactants and associated surfactant recovery system are proprietary items. The laboratory operation of the GHEA process is simple and highly effective.

However, since the GHEA process has not been applied on a commercial scale, a bench-scale treatability study is in progress at NJIT to demonstrate the technical feasibility and to generate process design data for construction of a site-specific groundwater treatment plant. Table 3-8 presents the key testing procedures for soil washing and soil column leaching tests with surfactants extraction.

Portions of Item I - Soil Decontamination by Extraction with Surfactant and Item II - Soil Column Leaching with Surfactant were completed and their results are presented in Appendix B. The soil washing with surfactant extraction results are summarized below:

Surfactant Dosing	= 5% of Soil (by weight)		
Wash Ratio	= 2 to 1		
Wash Stages	= 2		
Rinse Ratio	= 4 to 1		
TPH Analysis:	Pre-treated Soil	=	1534 ppm
	Treated Soil	=	83 ppm
	% Removal	=	94.6%

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4.0 CLEANUP LEVELS TO BE ACHIEVED

The proposed cleanup actions will address the following remedial response objectives at the Teterboro Facility:

- o Prevent/eliminate migration of contaminated groundwater and restore the quality of the shallow aquifer at the property;

- o Eliminate exposure pathways to contaminated soils; and

- o Detoxify the facility and property as required by New Jersey Environmental Cleanup Responsibility Act (ECRA).

4.1 SOIL CLEANUP LEVELS

The proposed remedial actions for soil cleanup will meet the NJ Soil Cleanup Objectives and will achieve the NJ Soil Action Levels. NJDEP generally establishes soil cleanup levels based upon risk assessments to ensure that human health is protected from direct contact and groundwater is protected from degradation due to leaching. Based on the NJ Soil Cleanup Standards, remedial alternatives which either contain or remove the contaminated soil are considered to attain these standards, since either remedial approach will eliminate the exposure pathways which create a human health risk.

Some of the cleanup objectives proposed by ECRA have been accepted by the NJ Soil Cleanup Standards. The ECRA provides guidance on making a determination as to whether a site is not contaminated by hazardous materials and requires that minimum standards be established for soil, groundwater and surface water quality or detoxification of the sites of certain industrial establishments.

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The cleanup objectives applied at specific sites may be different depending on the specific site factors. NJ Soil Action levels are determined based on background for inorganics and risk assessment for organics. In their absence, however, the surrogate action levels are used. As shown in Table 4-1, the proposed cleanup plan will achieve the NJ Soil Action Levels for the following contaminants as applicable to the site's soil:

- o PAHs or BNC - cleanup level is 1 mg/kg (NJ Soil Action Level)
- o Total Petroleum Hydrocarbons - cleanup level is 1000 mg/kg (surrogate action level)
- o Cadmium - cleanup level is 3 mg/kg (NJ Soil Action Level)
- o Copper - cleanup level is 170 mg/kg (NJ Soil Action Level)

4.2 GROUNDWATER CLEANUP LEVELS

The effluent of the proposed groundwater treatment system (GHEA process treatment plant) will meet the Maximum Contaminant Levels for Drinking Water established by the NJ Safe Drinking Water Act and A-280 Amendments as proposed in NJAC 7:10-16.7a and NJ Water Protection Control Act Primary Standards for Groundwater Classes GW-1 and GW-2 (NJAC 7:9-6.6a) and NJ Pollutant Discharge Elimination System (PDES) Maximum Concentration of Constituents for Groundwater Protection (NJAC 7:14A-6.15). As shown in Table 4-1, the long-term groundwater pump/treatment will restore the contaminated shallow aquifer in the site and achieve the following cleanup levels.

- o Cadmium (Cd) - cleanup level is 10 ppb

TABLE 4-1

CLEANUP LEVELS TO BE ACHIEVED FOR CONTAMINATED SOIL AND GROUNDWATER

CHEMICAL	NJSDWA(1) MCLs (PPB)	NJAC 7:9-6 (2) GROUNDWATER STANDARDS (PPM	NJDEP SOIL ACTION LEVEL (PPM)*
SOIL			
Polycyclic Aromatic Hydrocarbon (PAHs)			10
Total Petroleum Hydrocarbons (TPH)			1000
Base-Neutral/Acid (BNC)			10
Cadmium (Cd)			3
Copper (Cu)			170
GROUNDWATER			
Base-Natural/Acid Extractables (BNAs)		0.05	
Trans-1,2-Di-Chloroethene	10		
Total Volatile Organic (VOCs)		0.01	
Vinyl Chloride	2		
Cadmium	10	0.01	
Chromium (Hex)	50	0.05	

*ACTION LEVELS BASED ON NJ ENVIRONMENTAL CLEANUP RESPONSIBILITY ACT (ECRA)

(1) Maximum Contaminant Levels for drinking water: NJ Safe Drinking Water Act and A-280 Amendments, proposed NJAC 7:10-16:7a

(2) NJ Water Pollution Control Act primary standards for groundwater classes GW-1 and GW-2, N.J.A.C. 7:9-6.6(a)

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- Chromium (HexCr) - cleanup level is 50 ppb

- Base-Neutral/Acid Extractables (BNAs) - cleanup level is 0.05 ppm

- Trans-1,2-Dichloroethene - cleanup level is 10 ppb

- Total Volatile Organic Compounds (VOCs) - cleanup level is 0.01 ppm

- Vinyl Chloride - cleanup level is 2 ppb

1) Contaminated Soil Areas

- Powerhouse Fuel Oil Storage Tank (Area 6)
- Fuel Oil Storage Tank Area and Plant 4 Receiving Area (Areas 8 and 10)

2) Contaminated Groundwater Areas

- Chemical Storage Area (Area 1)
- Waste Solvent Storage Tank (Area 2)
- Waste Oil/Solvent Storage Area (Area 3)
- Hazardous Waste Storage Area (Area 5)

The general classes of contaminants found on-site consisted of organics (petroleum hydrocarbon compounds) and metals (copper and cadmium) for soil, and volatile organics, base/neutrals/ acid extractables, cadmium and chromium for groundwater. The volatile organics consisted primarily of trans-1,2-dichloroethene and vinyl chloride.

5.2.3 Training of Personnel

Basic Training Required:

o All personnel intended for work in any of the remediation activities must pass the physical examination for suitability of working in a hazardous waste site with personnel protective equipment;

o All personnel who might be required to wear respiratory protection (Level C and Level B) must complete a basic Hazardous Waste Training Program;

6.0 POST-REMEDIATION SAMPLING AND MONITORING PLAN

The post-remediation sampling and monitoring plan would consist of:

- unsaturated soil sampling from the soil cleanup areas;
- existing monitoring well sampling;
- monitoring of the groundwater treatment system; and
- evaluation of contaminated soils and groundwater cleanup.

6.1 UNSATURATED SOIL SAMPLING

A soil sample would be collected annually from the contaminated soil cleanup areas including Areas 1,2,3 and 5 and Areas 8 and 10 where subject to the in-situ soil flushing program. The soil samples would be analyzed for TPH for Areas 8 and 10 and BNAs, trans-1,2-dichloroethene, VOCs, cadmium and mercury for Areas 1,2,3 and 5 to either ensure that the areas have been totally cleaned in compliance with ARARs or to monitor the progress of the ongoing remedial actions. The post-remediation soil sampling program would be modified based on the monitoring results. The soil sampling in particular would be completed after the first year of sampling if no further contamination were found from Area 7.

6.2 EXISTING MONITORING WELL SAMPLING

1. Previous Groundwater Monitoring

The "Chemical Characterization Report for Teterboro Facility, April 1991" provides the existing site groundwater monitoring information as the Field Sampling Plan results. One round of groundwater sampling at the 20 existing monitoring wells as shown in Figure 2-6 will be conducted prior to the implementation

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of groundwater pumping and treatment to confirm the existing groundwater water quality and to provide the basis of groundwater cleanup evaluation. The groundwater samples will be analyzed for pH, TDS, VOCs plus 15 analysis, BNAs, trans-1,2-dichloroethene, vinyl chloride, cadmium and chromium.

2. <u>Groundwater Monitoring During In-Situ Flushing and Groundwater Treatment</u>

The existing monitoring well sampling program would consist of semi-annual sampling of one upgradient (CS-15) and three downgradient wells (CS-5, WT-1 and OS-1). The groundwater elevation would be determined at each well and samples collected for the analyses of pH, TDS, BNAs, trans-1-2-dichloroethene, vinyl chloride, cadmium, chromium and VOCs plus 15 analyses. This long-term groundwater monitoring program would be modified on the basis of monitoring results and an evaluation of the groundwater cleanup achieved.

3. <u>Post Groundwater Monitoring</u>

After the completion of the in-situ soil flushing and groundwater cleanup, one round of groundwater sampling at the 20 existing monitoring wells as shown in Figure 2-6 will be conducted to ensure that the proposed remedial actions have achieved the desired cleanup levels in compliance with the ARARs. The groundwater samples will be analyzed for pH, TDS, VOCs plus 15 analysis, BNAs, trans-1,2- dichloroethene, vinyl chloride, cadmium and chromium which will be used for evaluation of contaminated soil and groundwater cleanup at the Teterboro Facility.

6.3 GROUNDWATER TREATMENT SYSTEM MONITORING

A long-term sampling and monitoring program is required for evaluation of the treatment efficiency and effluent discharge compliance of the GHEA process treatment plant. Influent and effluent streams will be sampled periodically to support efficient operation of the groundwater treatment system. Influent samples will be collected from the well point extraction system discharge point and the effluent will be collected from the reinjection point of the treated groundwater. The reinjection of the treated groundwater will require a permit under the New Jersey Pollutant Discharge Elimination System (NJSDDES, NJAC 7:14A-1). The frequency of groundwater sampling would depend on both the variability of the influent composition and the predictability of the treatment system performance. The influent and effluent will be sampled once every month for BNAs, trans-1-2-dichloroethene, VOCs and vinyl chloride analysis.

6.4 EVALUATION OF CONTAMINATED SOIL AND GROUNDWATER CLEANUP

An evaluation program will be performed to determine the effectiveness of the in-situ soil flushing remediation. The data from the soil monitoring, existing well monitoring and groundwater treatment system monitoring will provide sufficient information for the soil and groundwater cleanup progress evaluation and comparisons of key contaminants between upgradient and downgradient wells. The periodic influent and effluent quality evaluation bf the groundwater treatment system will reveal the treatment efficiency of the in-situ soil flushing system. The key contaminants to be studied would include BNAs, trans-1,2-dichloroethene, VOCs, cadmium, chromium and vinyl chloride.

7.0 PROGRESS REPORT OF CLEANUP

The site cleanup progress reports to NJDEP would include two types of report:

- Short-term cleanup construction completion report; and

- Long-term cleanup operation monitoring report.

Short-Term Cleanup Construction Completion Reports

The short-term cleanup report would be provided at the completion of the following remedial constructions:

1. Contaminated soil cleanup at the Powerhouse Fuel Storage Tank (Area 6) for excavation, off-site petroleum hydrocarbon contaminated soil recycling and clean soil backfill.

2. Groundwater pump/treatment system installation/testing at Areas 1,2,3 and 5 and Areas 8 and 10 for slurry wall, wellpoint extraction system, GHEA process treatment plant and french drain reinjection system.

The short-term cleanup construction reports would address the removal/treatment/disposal of contaminated soil and information on the off-site treatment/disposal facilities. The completion report for the groundwater pump/treatment system would include the description and function of the groundwater extraction system, treatment system and recharge system as well as the operation test results.

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It is expected that these reports would be submitted to NJDEP four months after completion of mobilization for the soil cleanup and 10 months after completion of mobilization for the groundwater pump and treatment system.

Long-Term Cleanup Operation Monitoring Reports

The periodic progress reports to be submitted to NJDEP would include:

1. Monthly groundwater treatment system monitoring report would include the influent/effluent sampling results of the groundwater treatment system operation in compliance with the NJPDES permit requirements.

2. Annual groundwater cleanup evaluation report would include the treatment efficiency and cleanup progress based on the analysis of the soil sampling, existing monitoring well sampling and groundwater treatment monitoring results.

3. Site cleanup final report would be submitted to NJDEP when the groundwater treatment system influent quality achieves the target cleanup levels for the contaminants of concern (see Table 4-1).

ATTACHMENT F

ECRA CASE #86914

Allied-Signal Aerospace Company

Field Sampling Plan Results Report

for the

Allied-Signal Aerospace Teterboro Facility Teterboro, New Jersey

Prepared by

EBASCO ENVIRONMENTAL
A Division of EBASCO SERVICES INCORPORATED

June 1990

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1.0 INTRODUCTION

On February 2, 1990, the Allied Signal Aerospace Company (Allied), formerly the Bendix Corporation, directed Ebasco Environmental (Ebasco), a subsidiary of Ebasco Services, Inc., to conduct a sampling program on the Allied Signal properties in Teterboro, New Jersey. This program was conducted in response to a directive issued February 2, 1990 by the New Jersey Department of Environmental Protection (NJDEP). The sampling program was executed in accordance with the "Final ECRA Chemical Field Sampling and Analysis Plan Allied Signal Property" (the Plan) dated January 1990 and the modifications therein as approved by the NJDEP on February 16, 1990. This report presents the results of the program and a recommendation for submission of a Sampling Plan Addendum as requested by Item 34 in the February 2, 1990 NJDEP Directive.

1.1 OBJECTIVES

The objectives of the sampling program were:

- to obtain additional information to verify and/or supplement existing characterization data regarding the nature and extent of soil and groundwater contamination previously noted.

- to evaluate the potential for adverse environmental impact in areas (not previously studied) used for storage of hazardous materials or waste.

1.2 SITE LOCATION AND DESCRIPTION

The Allied Facility is located in the town of Teterboro, Bergen County, New Jersey and is therefore referred to herein as the Allied Teterboro Facility. It is bounded to the north by

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Route 46, to the west by Route 17, to the east by Industrial Avenue, and to the south by Metpath, Inc. and Sumitomo Machinery Corporation of America properties (Figure 1).

The Facility occupies approximately 70.2 acres and presently houses the Flight, Guidance, and Test Systems Divisions of Allied Signal Aerospace Company which manufactures electronic guidance systems and components for civilian and military aircrafts. The Facility consists of several manufacturing buildings, the largest of which is Plant No. 1, and approximately fifteen support buildings including: a hazardous waste storage building, a chemical storage building, a wastewater treatment building, two engineering buildings, and a boiler house which supplies both heat and steam to the Facility (Figure 2).

Parallel to the eastern and western Facility boundaries are two storm water drainage ditches (channels) which serve as part of the Bergen County drainage system (Figure 2). At present these ditches are used to collect and channel surface water runoff directly and/or from piped discharge lines located throughout the Facility, as well as from areas upgradient of the Facility. A number of these lines were, in the past, permitted (NJPDES) to discharge wastewater outflow from Facility operations. Wastewater discharge to the channels ceased in 1981.

The eastern and western storm water drainage ditches are connected by three subsurface, east-west trending equalization ditches which serve as overflow lines between the two boundary channels.

1.3 SITE HISTORY

The parcel of land currently occupied by the Allied Teterboro Facility was acquired by Bendix Corporation (Bendix) in 1937. At this time Bendix purchased a 101-acre parcel which was

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located parallel to Industrial Avenue and the western boundary of the Teterboro Airport property. Although the land consisted, for the most part, of poorly drained marshland, partial development was conducted by the Riser Land Development Co. to promote the sale of the property. In addition, Bendix, was required to additionally develop the land for on-site construction of buildings and amenities.

In 1941, Bendix sold a large portion of the property to the U.S. Department of the Defense (Navy), which in turn commissioned Bendix to build and operate a foundry for the production of magnesium and aluminum castings. In addition to the foundry, the Navy site included a sanitary sewage treatment facility and a small document incinerator. In 1955, an additional 40,000 square feet was added to the magnesium foundry to consolidate foundry operations to one location. The Navy terminated its use of the foundry in 1961.

Bendix acquired the property back from the Navy in 1961 and continued limited foundry operations until 1968. In 1968, foundry operations ceased and the buildings were converted for use as office space in 1969.

In 1977, Bendix sold two parcels of land totalling approximately 22 acres of the southwestern portion of the property to Metpath Inc. and Sumitomo Machinery Corporation of America (Sumitomo) (Figure 2). A second parcel of land (8.7 acres) was subsequently sold to Metpath Inc. in September 1980. The properties purchased by Sumitomo contained the former Naval sewage facility and document incinerator.

The property transfer of the remaining 70.2 acres from Bendix Corporation to the Allied Signal Company occurred in 1985.

1.4 PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIVITIES

In July 1984, Leggette, Brashears and Graham, Inc. (LBG) of Wilton Connecticut, conducted a limited hydrogeologic investigation at the Facility on behalf of the Allied Signal Aerospace Company. This investigation was restricted to the area immediately surrounding the Chemical Storage Building. In December of 1985, the investigation was expanded to include the area formerly occupied by a Waste Solvent Tank.

LBG's 1984 investigation included the installation and sampling of ten groundwater monitoring wells in the vicinity of the Chemical Storage Building. Analysis of groundwater samples from these wells indicated the presence of a number of volatile organic compounds (VOCs). The compounds detected include: methylene chloride, 1,1,dichloroethene, toluene, 1,2 trans-dichloroethylene, 1,1,1 trichloroethylene, and vinyl chloride. Arsenic, an inorganic compound was also detected.

As a result of the hydrogeologic investigation conducted by LBG, a "french drain" system was installed in the vicinity of the Chemical Storage Building (Area 1) to channel and collect groundwater. Limited operation of this system was conducted prior to implementation of the FSP discussed in this report. In addition, the area surrounding the Chemical Storage Building was paved with an asphalt cap.

Soil samples collected by LBG in the vicinity of the former Waste Solvent Tank, exhibited elevated levels of chromium. Elevated readings on the organic vapor analyzer (OVA) during air monitoring of the sampling activities in the vicinity of the former Waste Solvent Tank were also noted. Volatile organic analysis were not performed on any of the samples collected in this area.

Remedial activities in the vicinity of the former Waste Solvent Tank (Area 2) included the excavation of approximately 80 cubic yards of soil from the area surrounding the former tank.

In 1985, Direct Environmental conducted limited soil sampling during tank removal operations in Area 3 occupied by the two Waste Oil/Solvent Storage Tanks. As a result of these activities a total of 75 cubic yards of soil was excavated and removed from this former storage site.

2.0 SUMMARY OF AND MODIFICATIONS TO FIELD SAMPLING PLAN

2.1 SUMMARY OF FIELD SAMPLING PLAN

The primary objective of the Field Sampling Plan (FSP) was to develop a database from which areas of potential concern could be evaluated. This database would also be supplemented by the existing data gathered during previous investigations.

As described in the FSP, the hydrogeological investigation performed at the Allied Teterboro Facility was separated into thirteen specific areas. These areas were identified from known and/or potential areas of environmental concern based on past site activities and previous investigations. The location of each area is shown in Figure 3 and is listed as follows:

- Area 1 - Chemical Storage Area
- Area 2 - Waste Solvent Storage Tank
- Area 3 - Waste Oil/Solvent Storage Tanks
- Area 4 - Jet Fuel Storage Tanks
- Area 5 - Hazardous Waste Storage Area
- Area 6 - Powerhouse Fuel Storage Tanks
- Area 7 - Foundry Storage Area
- Area 8 - Plant 4 Receiving Area
- Area 9 - Plant 5 (East)
- Area 10 - Fuel Oil Storage Tanks
- Area 11 - West Drainage Ditch & Boiler Blowdown Outfall
- Area 12 - Equalization Ditch
- Area 13 - East Drainage Ditch

All tanks mentioned in the areas noted above, with the exception of the Powerhouse Fuel Storage Tanks (Area 6), are no longer present and were removed prior to initiation of this investigation. In addition, Areas 1, 2 and 3 were at least partially remediated prior to execution of the FSP. Additional sampling in these areas was proposed to evaluate the effectiveness of the limited remediation.

2.2 MODIFICATIONS TO THE FIELD SAMPLING PLAN

Site conditions existing at the time of this investigation necessitated modifications to the FSP. The following sections include a description of general and area specific modifications.

2.2.1 General Modifications

The following modifications are generic rather than related to any specific area and are principally concerned with the field procedures used to perform the investigation.

- o At various locations throughout the site, the occurrence of underground utilities, overhead lines, and confined space made access for drill rigs and split-spoon sampling impossible. In such cases, a hand auger/bucket sampler technique was employed for soil sample collection.

- o In some instances, the number of soil samples indicated in the FSP were not obtained due to poor sample recovery in the split-spoon sampler and/or the overlapping of sampling intervals.

- o Groundwater monitoring well construction details were modified in order to accommodate the occurrence of a shallow water table. These modifications were discussed with and approved by NJDEP (verbal communication, March 1990). Section 3.4 details well construction practices at the Facility.

- Alternative analytical methods to those proposed in Table 2 of the approved FSP, were employed by Analytikem Laboratories for analysis of soil and groundwater samples upon consultation and approval by NJDEP representatives (February 1990).

2.2.2 Area Specific Modifications

Modifications to the FSP for specific areas under investigation were required for Areas 1, 3, 4, and 6. These modifications are discussed as follows:

- Area 1 - Chemical Storage Area: The approved FSP required the installation of three new monitoring wells around the Chemical Storage Building to supplement the existing on-site wells. An evaluation of the existing wells by Allied, NJDEP and Ebasco personnel revealed the wells to be in poor condition and that groundwater samples obtained from these wells would not be representative of groundwater conditions. Upon authorization of NJDEP, the existing monitoring wells in the vicinity of the Chemical Storage Building were decommissioned by a New Jersey licensed well driller (see Section 3.3).

  To compensate for the abandonment of the existing wells and enhance the Area 1 investigation, the installation of eleven new monitoring wells in the vicinity of the Chemical Storage Building was proposed by Allied and Ebasco and approved by NJDEP (see Section 3.4). These eleven wells include: the three wells originally proposed in the FSP; six new wells to replace the abandoned existing wells; and two additional wells. The two additional wells were installed to obtain a better understanding of the existing hydrogeologic conditions in this area.

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- <u>Area 3 - Waste Oil/Solvent Tanks</u>: The FSP originally required the installation of a single monitoring well in the vicinity of the Waste Oil/Solvent Tanks. This well was to be installed in the roadway adjacent to the concrete receiving pad. However, due to the presence of underground utilities, the location of the proposed monitoring well was moved to the other side of the roadway (approximately 25 ft to the southwest) and installed in FSP Area 5 (Hazardous Waste Storage Area) boring location CP-03 (see Section 3.4.3).

  The sampling interval within this boring was also changed from 10 feet to 9 feet below grade. The sample was collected at a depth of 9 ft due to the occurrence of elevated readings on the OVA at this depth.

- <u>Area 4 - Jet Fuel Storage Tanks</u>: Four additional borings were incorporated in the study of the former Jet Fuel Storage Tank area to better evaluate the extent of potential contamination (see Section 3.1.4). The sampling interval in these borings is the same as those proposed in the FSP for other borings in this area.

- <u>Area 6 - Powerhouse Fuel Oil Storage Tanks</u>: To better adequately delineate potential contamination in the vicinity of the Powerhouse Fuel Tanks, four additional soil borings were incorporated into the soil boring program (see Section 3.1.6). All samples collected from the additional borings were obtained at depths indicated for the borings outlined in the FSP.

3.0 FIELD ACTIVITIES

The field activities associated with the ECRA investigation of the Allied Teterboro Facility, were implemented by Ebasco Environmental in late February and were completed by the end of April 1990. The activities performed included:

- soil boring and sampling,
- monitoring well installation and development,
- evaluation and abandonment of existing monitoring wells,
- drainage channel sediment sampling, and
- groundwater sampling.

The details and procedures used for execution of each of these activities are described in the sections which follow. The procedures used were consistent with NJDEP guidance contained in the Draft ECRA Sampling Plan Guide dated 6 June 1986, and the Field Sampling Procedures Manual of February 1988.

3.1 SOIL BORINGS AND SAMPLING

The soil boring and sampling program was implemented in late February 1990. The objective of this program was to obtain soil samples for the purpose of evaluating and delineating the nature and extent of previously identified and potential soil contamination in various areas throughout the site.

The soil boring program was conducted in ten of the thirteen areas presented in Section 2.1. Three of these areas, Areas 1, 2 and 3 (Figure 3), were previously identified and specified in the FSP as containing elevated levels of contaminant concentrations. The remaining seven areas (Areas 4 - 10 in Figure 3) were incorporated in this investigation to evaluate the potential for elevated levels of contaminant concentrations.

A total of 74 borings were advanced and 126 soil samples (includes 7 field duplicates) were collected throughout the ten areas. In addition, one "background boring" was advanced and sampled as part of this investigation to provide a baseline for the the soil boring program. The individual number of borings and samples collected from each of the designated areas (including the "background" area) differs and are therefore discussed separately in Subsections 3.1.1 through 3.1.10 and 3.1.14. The procedures used for boring advancement and sampling are generally consistent and are summarized as follows.

Soil borings were advanced by either rotary drilling or hand augering techniques. The method used was primarily dependent on accessibility to the proposed boring location and the absence or occurrence of underground and/or overhead utilities. The method of borehole advancement used at each location is specified on the boring logs contained in Appendix A.

Drilled boreholes were advanced using a mobile drill rig and 8 inch inner diameter (I.D.) hollow stem augers. The augers were used to advance the borehole to the upper limit of the sampling interval where upon soil samples were obtained by the split-spoon hammer-drop system. A 2 ft long, 3 inch outer diameter (O.D.) split-spoon sampler was driven, using a 300 lb. hammer and 24 inch fall, beyond the auger flights to obtain an undisturbed sample of the underlying soil. The soil was extracted directly from the split-spoon and placed in the appropriate laboratory supplied sample containers. Samples obtained for volatile organic analysis were collected first. Each sample container was subsequently stored on ice for shipment to the laboratory.

Manually augered borings were advanced using a 10 inch long, 4 inch O.D. stainless steel hand auger. At the upper limit of the appropriate sampling interval a hollow, stainless steel bucket auger was manually driven into the undisturbed soil and a sample was collected. Samples were removed from the auger bucket using a stainless steel trowel and transferred to the laboratory supplied sample containers as noted above.

All drilling, augering, and sampling equipment was decontaminated prior to and/or subsequent to borehole advancement and/or sample collection. The drilling equipment (rig, augers, etc.) was decontaminated in a designated area using a pressurized steam cleaner. All sampling equipment (split-spoons, hand and bucket augers, trowels, etc.) was decontaminated in the field using the following procedure:

1) tap water/non phosphate detergent scrub;
2) distilled deionized water rinse;
3) 10% nitric acid rinse, (1% nitric acid for carbon steel split spoons;
4) distilled deionized water rinse;
5) acetone (pesticide grade) rinse;
6) air dry;
7) distilled deionized water rinse;
8) air dry; and
9) aluminum foil wrap.

QA/QC samples were also obtained to ensure the integrity of sampling and decontamination procedures as well as analytical laboratory techniques (Table 1). The QA/QC samples are described as follows:

- One trip blank, containing laboratory supplied deionized water, was included in each shipment to the laboratory when the shipment contained soil samples to be analyzed for volatile organic compounds.

- At least one field blank was collected on each day of sampling and submitted for all analyses specified for the soils collected on that day. Field blanks were

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obtained by pouring the laboratory supplied deionized water over and through all sampling equipment and collecting the water in the appropriately labelled laboratory supplied sample containers. Field blanks were generated subsequent to one sampling and field decontamination event.

- Two deionized water blanks of laboratory supplied water were collected and submitted to the laboratory for analysis to ensure that the water was analyte free. The samples were collected by pouring the laboratory supplied deionized water directly into laboratory suppled sample containers.

- One duplicate soil sample was collected for every twenty soil samples obtained and submitted for the laboratory analysis along with the associated parent sample (see Tables 2 through 12).

3.1.1 Area 1 - Chemical Storage Area

The area surrounding the Chemical Storage Building, in the central portion of the Facility, was previously occupied by two underground storage tanks (containing hexane and gasoline respectively), a concrete materials storage pad, and a containment drum rack. Excavation activities associated with the construction of the Chemical Storage Building in 1984 revealed the presence of petroleum contaminated soils. As a result of this finding, a hydrogeological investigation was performed and the area was targeted for remediation. In 1985, a "french drain" system was installed at the Facility to channel and collect contaminated groundwater in the vicinity of the Chemical Storage Building.

The investigation described herein was initiated in order to evaluate the present quality of the soils and groundwater in

Area 1 (Figure 3) and evaluate the effectiveness of the "french drain" system.

A soil boring and sampling program, consisting of the installation of 18 soil borings (CS-01 through CS-18), was conducted in February and March 1990 (Figure 4). Twenty-seven soil samples and two field duplicates were collected from these borings and submitted to Analytikem Laboratories for analyses (Table 2). Ten of the borings were sampled at a single interval. Seven of the borings were sampled at two intervals (i.e., 14 samples collected), representing that portion of the soil profile above and below the water table. The remaining boring, CS-06, was sampled at three distinct intervals. Field duplicates were also collected from CS-06 at two of the three sample intervals.

Laboratory testing parameters included one or more of the following: volatile organic compounds (VOCs); VOCs + xylene; semi-volatile organic compounds including base neutral compounds (BNCs) and/or acid extractable compounds (AECs); Priority Pollutant List (PPL) metals; and total petroleum hydrocarbons (TPHs). The laboratory analyses are summarized in Table 2.

3.1.2 Area 2 - Waste Solvent Storage Tank

A 5000 gallon, Waste Solvent Storage Tank (Area 2) was formerly located adjacent to the south side of Plant 1 in the central portion of the Facility (Figure 3). Tank removal and sampling activities conducted in 1985 revealed elevated levels of organic and inorganic contamination in the soil. As a result approximately 80 cubic yards of soil was excavated from this location.

The investigation proposed for Area 2 (Figure 3) in the FSP was conducted on March 1 and 9, 1990 to evaluate the remediation performed in this area.

Four soil borings, labelled WT-01 through WT-04, were advanced during the Area 2 investigation. The locations of these borings are shown in Figure 4.

Two distinct, but vertically continuous, 6 inch samples were collected from each boring with the exception of boring WT-02. The depth of sampling varied from one location to another, ranging from 6-18 inches at boring WT-02 to 72-84 inches at boring WT-04 (Table 3). In addition, two QA/QC field duplicates were obtained from boring WT-01.

A total of nine samples (including the two duplicates) were submitted to Analytikem Laboratories for analysis of one or more of the following parameters: VOCs; BNCs; PPL metals; and/or TPHs. Table 3 presents a summary of the analytical testing for each sample.

3.1.3 Area 3 - Waste Oil/Solvent Storage Tanks

Area 3, located in the east-central portion of the Facility, contained two underground storage tanks used for the containment of waste oil and solvent (Figure 3). Soil contamination, detected during tank removal operations in 1985, prompted the excavation of these soils. Tb evaluate the effectiveness of these remedial activities a supplemental investigation was proposed and initiated, as part of this FSP.

The soil boring and sampling program was conducted in Area 3 in February and March 1990. Four borings, designated OS-01 through OS-04, were advanced in and surrounding the area formerly occupied by the underground tanks (Figure 4). The location of boring OS-01 as shown in Figure 4 is a modification of that proposed in the FSP (see Subsection 2.2.2). The Area 3 boring OS-01 was re-located to Area 5 boring CP-03. Boring CP-03 was converted to OS-01 by re-advancing and sampling the borehole at a greater depth.

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One sample was collected from each of the four Area 3 borings at a depth ranging from 3.0-10.5 ft below grade (Table 4). In addition, one field duplicate was obtained from boring OS-04.

All samples collected were submitted to Analytikem Laboratories for analysis for the following parameters: VOCs, BNCs, PPL metals, TPHs, and polychlorinated biphenyls (PCBs). In addition to the above mentioned parameters, the sample collected from boring OS-01 was analyzed for acid extractable compounds (AECs) and xylene. Sample OS-01S-01 was not analyzed for PCBs. Table 4 presents a summary of all samples obtained and associated laboratory analyses performed.

3.1.4 Area 4 - Jet Fuel Storage Tanks

Prior to 1985, four underground Jet Fuel Storage Tanks (Area 2) were located in the eastern portion of the Facility, between Plant 1 and the Engineering Building (Figure 3). These tanks were removed in 1985 at which time soil samples were taken for analytical testing for petroleum hydrocarbon contamination. As reported in the FSP, the minor TPH concentrations detected were not attributed to the underground tanks.

In order to evaluate the nature and extent of the petroleum hydrocarbon contamination and the potential for other contamination in Area 4, a soil boring and sampling program was conducted in April 1990.

A total of twelve soil borings were advanced in and immediately surrounding the area formerly occupied by the Jet Fuel Storage Tanks. Eight of these borings, JF-01 through JF-08, are located as proposed in the FSP (Figure 5). The remaining four borings (JF-09 through JF-12) were subsequently added to this investigation to more adequately define the limits of potential contamination (Figure 5).

Soil samples were obtained from each boring at the first encounter with the water table and at the fill/clay interface when possible. Two samples were taken from each of the seven borings and one sample was collected from the remaining five borings. The nineteen samples collected in Area 4 are presented in Table 5.

All Area 4 samples were analyzed by Analytikem Laboratories for one or more of the following parameters: benzene, toluene, and xylene (BTX); polynuclear aromatic hydrocarbons (PAHs); TPHs; and volatile and semivolatile organic compounds (Table 5).

3.1.5 Area 5 - Hazardous Waste Storage Area

The Area 5 investigation focused on evaluating the potential for contamination in the vicinity of the Hazardous Waste Storage Building located in the west-central portion of the Facility (Figure 2). Field activities were limited to the concrete receiving pad, located on the west side of the building (Figure 3), where potential spills and/or temporary storage of hazardous materials may have adversely affected the surrounding environment.

Field activities associated with this investigation were conducted on 28 March 1990 and included the installation and sampling of three shallow soil borings (Figure 4). Total completion depths of these borings ranged from 44 in. (boring CP-01) to 54 inches (borings CP-02 and CP-03).

Soil from each of the three borings was collected at two separate intervals ranging between 6-54 in. below grade (Table 6). Three samples were collected from boring CP-03 due to poor soil recovery in the sampler.

All seven samples collected from the Area 5 borings were submitted to Analytikem Laboratories for testing of one or more of the following parameters: VOCs, BNCs, and PPL metals (Table 6).

3.1.6 Area 6 - Powerhouse Fuel Oil Storage Tanks

The Powerhouse Fuel Oil Storage Tanks (Area 6) are located in the northwestern portion of the Facility adjacent to the north side of the Boiler House (Figure 3). At present, five 25,000 gallon underground storage tanks are contained in this area.

Investigation activities were proposed and initiated in Area 6 to evaluate potential environmental concern with regard to fuel spills and/or tank leakage.

Investigation activities were conducted in March and April 1990 and included the advancement and sampling of 18 soil borings. As specified in the FSP, the borings were located adjacent to the outer limits of the existing tank area and designated PH-01 through PH-14 (Figure 6). Four additional borings (PH-15 through PH-18) were incorporated into this study to better evaluate the extent of potential contamination from the tanks contained in Area 6 (Figure 6).

Either one or two, 6 inch soil samples were collected from each of the 18 borings. One field duplicate was also collected for QA/QC purposes from boring PH-10. Sample collection depths in each boring were attempted at approximately 4.5 ft and 12 ft., in order to obtain samples at the water table and below the base elevation of the tanks, respectively. Designated sampling depths were not, however, achieved at all locations due to the presence of underground utilities and/or borehole collapse. A summary of the samples collected in Area 6 is included in Table 7.

All samples collected from the Powerhouse Fuel Oil Storage Tank borings were submitted to Analytikem Laboratories for analyses of one or more of the following: TPHs, PAHs, VOCs, BNCs, and/or benzene, toluene, and xylene (BTX). The analytical testing specified for each sample is also contained in Table 7.

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3.1.7 Area 7 - Foundry Storage Area

Foundry operations which occurred at the Facility between 1941 and 1966 were conducted in what is presently referred to as Plant 4. Although no disposal activities are associated with the foundry operations, a materials storage area was detected on a historic sequence of aerial photos. The foundry materials storage area was located on the southern portion of the Allied property, immediately adjacent to the eastern side of the current Plant 4 (Figure 3).

The soil program proposed for Area 7 was implemented to evaluate whether the storage of material in this area had an impact on the soil quality. In March 1990 three soil borings, labelled FS-01 through FS-03, were installed in the central portion of the former storage area (Figure 7). The locations of these borings, as proposed in the FSP, were modified slightly to better obtain samples in lieu of current Facility operations.

Two soil samples were collected from each boring (Table 8). One QA/QC field duplicate was collected from boring FS-01. The shallow samples, generally obtained between 6 - 18 in. below grade, were submitted to Analytikem Laboratories for analyses of BNCs, PPL metals, and TPHs. The deeper samples, collected at 18-24 in. below grade, were also submitted for the above mentioned parameters in addition to VOCs. The QA/QC sample was submitted for analysis of TPHs only (Table 8).

3.1.8 Area 8 - Plant 4 Receiving Area

Plant 4 formerly housed the foundry operations at the present day Allied Teterboro Facility. In the event that materials used for such cperations may pose present concerns, soil borings and sampling was initiated in the Plant 4 receiving area (loading platform) shown in Figure 3.

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An asphalt covered, concrete receiving area is located at the southeastern corner of Plant 4. Two soil borings, designated PR-01 and PR-02, were installed in this area on 16 and 19 March 1990 (Figure 7). Prior to boring installation the asphalt cap and concrete pad (approximately 8 inches thick) were penetrated using a 60 lh. jackhammer.

Two soil samples, consisting of one shallow and one deep, were collected from each of the two borings (Table 9). All samples were submitted to Analytikem Laboratories for VOCs, BNCs, PPL metals, and TPHs analyses.

3.1.9 <u>Area 9 - Plant 5 (East)</u>

Plant 5 is located in the southwestern portion of the Facility immediately adjacent to the north side of Plant 4. The area of concern to this investigation is located adjacent to the east-southeast corner of Plant 5 where, upon evaluating aerial photos of the Allied Facility, NJDEP representatives reported the storage of a materials (Figure 3). In response to this, a sampling program was developed to evaluate this area.

On 15 March 1990 two borings (PL-01 and PL-02) were advanced adjacent to the east-southeast corner of Plant 5 (Figure 7). Each boring was relatively shallow, reaching depths of 36 in. and 42 in. at PL-01 and PL-02, respectively.

Two soil samples (shallow and deep) were obtained from each of the two borings to delineate the vertical extent of potential contamination in this area. Each sample was submitted to Analytikem Laboratories for analysis of VOCs, BNCs, PPL metals, and TPHs. A summary of the soil boring and sampling program conducted in Area 9 is presented in Table 10.

3.1.10 Area 10 - Fuel Oil Storage Tanks

Area 10, located in the southwestern portion of the Facility (Figure 3), was at one time occupied by two 25,000 gallon underground fuel and storage tanks. As reported in the FSP, these tanks contained No. 4 and No. 6 fuel oil. An investigation was proposed and implemented in Area 10 in order to evaluate the potential impact which may have resulted from the presence of these underground tanks.

The investigation in Area 10 consisted of shallow boring advancement and soil sampling. The program was conducted between 1 and 26 March 1990 and involved the installation of 8 soil borings (Figure 7) and the collection of 9 soil samples (includes one duplicate) submitted to Analytikem Laboratories for analyses (Table 11).

Area 10 soil borings, designated FO-01 through FO-08, range in completion depths from a minimum 14 inches to a maximum 42 inches at FO-04 and FO-06, respectively. A six inch sample was collected from each location at various depths in each boring. A summary of the samples collected from the Area 10 borings is presented in Table 11.

The soil samples collected in this area were submitted for analytical testing of one or more of the following parameters: TPHs, PAHs, and/or benzene, toluene, and xylene (BTX). The analyses performed on each sample are also summarized in Table 11.

3.1.11 Area 11 - Western Drainage Ditch and Boiler Blowdown Outfall

Soil boring and sampling program not ccnducted in Area 11.

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3.1.12 Area 12 - Equalization Ditch

Soil boring and sampling program not conducted in Area 12.

3.1.13 Area 13 - Eastern Drainage Ditch

Soil boring and sampling program not conducted in Area 13.

3.1.14 Background Boring

In order to adequately evaluate Areas 1 through 10, the naturally occurring soil condition at the Facility was also examined.

One soil boring, herein referred to as the background boring (BK-01), was advanced in the northernmost portion of the Facility in the undeveloped area north of Plant 1 (Figure 3). The location of boring BK-01 was chosen not only to evaluate the soils but to subsequently evaluate upgradient groundwater conditions as well (see Section 3.4.4).

Two soil samples, collected at 18-24 in. and 24-30 in. below grade, were submitted to Analytikem Laboratories for analysis of VOCs and TPHs, and BNCs and PPL metals, respectively. Soil samples collected at boring location BK-01 are summarized in Table 12.

3.2 SEDIMENT SAMPLING

The Eastern and Western Drainage Ditches (Areas 11 and 13) which border the Allied Teterboro Facility, as well as the central Equalization Ditch (Area 12), were the focus of the sediment sampling program conducted as part of this investigation (Figure 3). At present these ditches are used to collect and channel surface water runoff directly and/or from piped discharge lines

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located throughout the Facility. A number of these lines were, in the past, permitted under NJPDES program to discharge wastewater outflow from Facility operations.

A total of 10 sediment samples (including one QA/QC duplicate) were collected throughout Areas 11, 12, and 13. Although the number of samples collected in each area differs (see Subsections 3.2.11 through 3.2.13) the procedures used to obtain each sample is consistent and is described as follows.

All sediment samples were collected using a stainless steel, 10 inch long hand auger/bucket sampler. A discrete, 6 inch thick, interval was sampled at each location and placed in the appropriately labelled laboratory supplied sample containers using a stainless steel trowel.

Decontamination of the sediment sampling equipment was performed in accordance with the decontamination procedures previously described in Section 3.1. QA/QC samples also described in Section 3.1 were collected where appropriate and applicable (Table 13).

3.2.1 Area 1 - Chemical Storage Area

Sediment sampling program not ccnducted in Area 1.

3.2.2 Area 2 - Waste Solvent Storage Tank

Sediment sampling program not conducted in Area 2.

3.2.3 Area 3 - Waste Oil/Solvent Storage Tanks

Sediment sampling program not conducted in Area 3.

3.2.4 Area 4 - Jet Fuel Storage Tanks

Sediment sampling program not conducted in Area 4.

3.2.5 Area 5 - Hazardous Waste Storage Area

Sediment sampling program not conducted in Area 5.

3.2.6 Area 6 - Powerhouse Fuel Storage Tanks

Sediment sampling program not conducted in Area 6.

3.2.7 Area 7 - Foundry Storage Area

Sediment sampling program not conducted in Area 7.

3.2.8 Area 8 - Plant 4 Receiving Area

Sediment sampling program not conducted in Area 8.

3.2.9 Area 9 - Plant 5 (East)

Sediment sampling program not conducted in Area 9.

3.2.10 Area 10 - Fuel Oil Storage Tanks

Sediment sampling program not conducted in Area 10.

3.2.11 Area 11 - Western Drainage Ditch & Boiler Blowdown Outfall

The western drainage ditch extends along the western property line parallel to the trend of the adjacent New York/New Jersey Railroad. At present, the western drainage ditch receives storm water runoff from a number of discharge points located througout the channel.

Storm water collected from roof leaders and parking lot catch basins is and always has been the primary discharge to the Western Drainage Ditch from the Facility. In the past, however, industrial wastewater was discharged through outfalls 001, 002, 003, and 005. These discharges were regulated and permitted (NJPDES) by the NJDEP. All discharge of industrial wastewater to the Western Drainage Ditch ceased in 1988.

Additional discharge to the Western Drainage Ditch was attributable to the Boiler Blowdown Outfall located approximately 80 ft downstream of Outfall 003. In 1980, the Boiler Blowdown discharge was routed to the sanitary sewer system.

The sediment sampling program was proposed for the Western Drainage Ditch in order to evaluate the impact of past discharge activities. This program was conducted on 23 March 1990 and included the collection of 6 sediment samples (includes one field duplicate) from various locations within the channel (Figure 8).

Samples obtained in Area 12 are designated WD-01 through WD-05 (Table 14). Sample WD-05 corresponds to the location of the Boiler Blowdown Outfall. In general, each sample was collected at depth of 0-6 inches.

Each of the samples obtained in Area 11 were analyzed for one of more of the following parameters: VOCs; BNCs; PPL metals; TPHs; PCBs; and cyanide (Table 14).

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3.2.12 Area 12 - Equalization Ditch

The east-west trending Equalization Ditch located in the central portion of the Facility (Figure 3) was the focus of this investigation. This ditch normally drains to the western channel. In the event of overflow, however, the Equalization Ditch acts as an overflow connection to the Eastern Drainage Ditch.

One sediment sample (EQ-01) was collected from the extreme western portion of the Equalization Ditch on 23 March 1990 (Figure 8). Access to the ditch was through a storm water drain located in the parking lot west of the Boiler House.

Sample EQ-01 was submitted to Analytikem Laboratories for analysis of the following parameters: VOCs, BNCs; TPHs, PCBs, and cyanide (Table 15).

3.2.13 Area 13 - Eastern Drainage Ditch

The Eastern Draiange Ditch extends across the length of the Allied Teterboro Facility parallel to Industrial Avenue. This ditch is currently occupied by a (60 inch diameter) concrete pipe used to contain and channel outflow from areas upgradient of the Facility as well as discharge from the Facility. At present, discharge to the drainage pipe from the Allied Teterboro Facility includes only storm water runoff.

Prior to installation of the concrete pipe, non-contact processing cooling water as well as storm water runoff was discharged to the Eastern Drainage Ditch. These cooling waters were generated from air compressors and the water cooling tower. All discharge from Outfall 004 was regulated and permitted (NJPDES) by NJDEP.

The sediment sampling program was proposed for the Eastern Drainage Ditch to evaluate if past discharge from the Facility had an impact on the soils in this area. Three sediment samples were collected from the Eastern Drainage Ditch on 23 March 1990. These samples (ED-01 through ED-03) were collected, adjacent to the concrete pipe, from that portion of the ditch formerly exposed to discharge (Figure 8). Sample ED-03 was obtained downstream of former Outfall 004. The remaining samples, ED-01 and ED-02, were collected at extreme upstream and downstream locations, respectively. No samples were collected from within the concrete pipe.

Each of the samples obtained in Area 13 were submitted to Analytikem Laboratories and analyzed for one or more of the following parameters: VOCs; PPL metals, TPHs. Table 16 summaries the samples collected in Area 13.

3.2.14 Background Boring

Not Applicable

3.3 INSPECTION AND ABANDONMENT OF EXISTING MONITORING WELLS

A visual inspection of existing wells was performed by Allied and Ebasco in February 1990. Of the ten monitoring wells installed by LBG (1984) in the vicinity of the Chemical Storage Building (Area 1), only eight were located during the inspection. It is believed the two remaining wells were paved over during construction of the french drain collection system in this area.

Observations made during this inspection indicated that all existing wells were in poor condition. None of the wells were equipped with inner locking caps, one was missing the outer protective cap, and in several, the bentonite seal was no longer present allowing for the infiltration of surface water runoff.

The findings of the existing well inspection suggested that groundwater samples obtained from these wells would not be representative of actual groundwater conditions. It was therefore recommended by Allied and Ebasco in cooperation with NJDEP that all existing wells be abandoned.

In March 1990 the eight existing wells were decommissioned by a licensed New Jersey driller. Each well was grouted to the surface using a bentonite/cement slurry.

3.4 MONITORING WELL INSTALLATION AND DEVELOPMENT

A monitoring well installation program was conducted at the Allied Teterboro Facility in March 1990. This program was restricted to the Chemical Storage Area (Area 1), Waste Solvent Tank Area (Area 2), and Waste Oil/Solvent Tank Area (Area 3) where fourteen of the previously installed soil borings were converted to groundwater monitoring wells. These wells were installed to allow for the collection of the necessary data needed to evaluate groundwater quality and existing hydrogeologic conditions at the Allied Teterboro Facility.

Following the completion of soil sampling activities at each of the fourteen locations, the borings were advanced (using hollow-stem augers) to a depth at which the first impermeable layer was encountered. Each well was constructed of a 4 inch I.D., flush threaded Schedule 40 PVC riser and 20-slot screen. The length of the well screens varied upon location.

Each well screen was positioned to straddle the water table by placing the screen base at a minimum of 2.0 feet below the surface of the water table. A sand pack, consisting of No. 1 Jessie Morie sand, was installed around the well screen to at least six inches above the top of the screen. A one foot thick bentonite seal was placed above the sandpack. The remaining borehole annular was backfilled to the surface using a Pcrtland cement grout. Each well was completed with an inner locking cap and a flush-mounted steel well cover. A cement pad was placed around the well cover to prevent water from entering the well. Well installation diagrams are contained in Appendix B.

Upon completion of well installation activities, each well was developed to maximize yield and minimize the amount of fines passing through the screen. Well development activities were not implemented until a minimum of 24 hrs had elapsed following well completion.

Each well was developed by the surge and bail method using a surge block and stainless steel or teflon bailer. A 4 inch diameter surge block was installed in the well casing, approximately 1 ft above the top of the well screen, in order to flush out fine grained material from the filter pack surrounding the well screen. Surging commenced for approximately 5 minutes where upon the surge block was removed and the well was bailed to evacuate the fine grained material introduced to the screen by surging. Surging and bailing was repeated until the turbidity of the water was significantly reduced and/or a minimum of 5 well volumes of water was removed.

All water generated during development activities was containerized in 55-gallon drums and stored at the Facility for later disposal.

The elevation of all monitoring well risers and the ground surface elevation at each well were surveyed by a New Jersey licensed surveyor. Elevation measurements were collected and reported in reference to the National Geodetic Datum (Sea Level) of 1929 (Table 17). In addition, the location of each well was surveyed and referenced to the New Jersey State Plane Coordinates System (Table 17).

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3.4.1 Area 1 - Chemical Storage Area

A total of eleven groundwater monitoring wells were installed in the vicinity of the Chemical Storage Building during this investigation. These wells were installed in eleven of the eighteen borings advanced in Area 1 during the soil sampling program. The locations of those borings converted to monitoring wells in March and April 1990 are shown in Figure 4.

Monitoring wells were installed in Area 1 to evaluate the impact of the french drain remediation system on groundwater contamination previously detected in this area. These wells were also used to obtain the necessary information needed to evaluate overall hydrogeologic conditions at the Facility.

In general all well borings were completed at a depth of 5 - 8 ft below grade (Table 18). Although the surface of the water table was encountered at a varying depths within each well, screen placement was accomplished such that the intake interval straddled the groundwater surface. Construction details for Area 1 monitoring wells (Figure 9) are summarized in Table 18.

Area 1 monitoring wells were developed on 8 through 15 March 1990. Development activities were accomplished using the surge and bail method described in Section 3.4. As noted in Table 18, well development was completed by evacuating approximately five well volumes of water and/or the turbidity of the discharge was visibly free of fines.

3.4.2 Area 2 - Waste Solvent Storage Tank

Of the four soil borings installed in Area 2 only one was converted to a groundwater monitoring well (Figure 4). Soil boring WT-01 was converted to monitoring well WT-01 on 13 March 1990. This well was installed to evaluate groundwater quality in the vicinity of the former Waste Solvent Storage Tank and to aid in the overall evaluation of hydrogeologic conditions at the Facility.

Monitoring well boring WT-01 was completed at a depth of 6 ft below grade. Groundwater was encountered approximately 3.5 ft below grade and a 3.5 ft long well screen was therefore placed at a depth of 2 to 5.5 ft. Construction details for monitoring well WT-01 (Figure 9) are summarized in Table 19.

Well development activities for WT-01 were conducted on 13 and 14 March 1990. Using the surge and bail method described in Section 3.4, approximately 6 well volumes of water were evacuated from WT-01 to complete development activities.

3.4.3 Area 3 - Waste Oil/Solvent Tanks

The approved FSP indicates that, as part of the Area 3 study, a groundwater monitoring well would be installed at the proposed boring location OS-01. The presence of underground utilities at the proposed location, however, did not allow for this boring (OS-01) to be advanced to the appropriate completion depth for well installation. Well installation activities were therefore modified, as discussed in Subsections 2.2.2 and 3.1.3, to be conducted at an existing boring location in close proximity to that originally proposed. Boring CP-03, previously advanced as part of the Area 5 (Hazardous Waste Storage Area) investigation, was converted to boring OS-01 and monitoring well OS-01 as a result of this modification.

Monitoring well OS-01 was installed on 14 March 1990 (Figures 4 and 9). This well was installed to evaluate groundwater quality in Area 3 as it relates to the effectiveness of past remediation activities in addition to supplying the necessary data needed for an overall evaluation of hydrogeologic conditions at the Facility.

Monitoring well boring OS-01 was completed at a depth of 8 ft. Groundwater was encountered at a depth of approximately 2 ft and a 5 ft long well screen was therefore placed from 2 to 7 ft below grade. Construction details for monitoring well OS-01 are outlined in Table 20.

Well development activities for OS-01 were conducted on 14 March 1990. Using the surge and bail method described in Section 3.4, approximately 3 well volumes of water were evacuated from OS-01 to complete development activities.

3.4.4 Area 4 - Jet Fuel Storage Tanks

Monitoring well installation not conducted in Area 4.

3.4.5 Area 5 - Hazardous Waste Storage Area

Monitoring well installation not conducted in Area 5.

3.4.6 Area 6 - Powerhouse Fuel Storage Tanks

Monitoring well installation not conducted in Area 6.

3.4.7 Area 7 - Foundry Storage Area

Monitoring well installation not conducted in Area 7.

3.4.8 Area 8 - Plant 4 Receiving Area

Monitoring well installation not conducted in Area 8.

3.4.9 Area 9 - Plant 5 (East)

Monitoring well installation not conducted in Area 9.

3.4.10 Area 10 - Fuel Oil Storage Tanks

Monitoring well installation not conducted in Area 10.

3.4.11 Area 11 - Western Drainage Ditch and Boiler Blowdown Outfall

Monitoring well installation not conducted in Area 11.

3.4.12 Area 12 - Equalization Ditch

Monitoring well installation not conducted in Area 12.

3.2.13 Area 13 - Eastern Drainage Ditch

Monitoring well installation not conducted in Area 13.

3.4.14 Background Boring

The background boring (BK-01) installed as part of the soil sampling program was converted to a groundwater monitoring well on 13 March 1990 (Figure 3). The location of this well was selected so that upgradient, potentially uncontaminated groundwater samples could be collected at the Facility. Background samples are needed to adequately evaluate groundwater quality and potential contamination at various locations throughout the facility. In addition, monitoring well BK-01 was also used to obtain hydrogeologic data needed to evaluate local groundwater flow conditions.

Monitoring well boring BK-01 was completed at a depth of 6 ft below grade. Groundwater was enccuntered approximately 4 ft below grade and a 3.5 ft Iong well screen was therefore placed at a depth of 2 to 5.5 ft. Construction details for monitoring well BK-01 are summarized in Table 21.

Monitoring well development activities were conducted on 15 March 1990. Using the surge and bail method described in Section 3.4, approximately three well volumes of water were evacuated from BK-01 to complete development activities.

3.5 GROUNDWATER SAMPLING

One round of groundwater sampling was conducted as part of the Allied Teterboro Facility investigation. All wells installed as part of this investigation were incorporated in the sampling program (Figure 9).

Groundwater sampling was conducted on 29 March through 4 April 1990. This event was scheduled at this time in order to allow a minimum 2 week recovery period to elapse following well development activities.

Laboratory cleaned, dedicated bailers were used to purge wells and obtain groundwater samples. Field decontamination was therefore limited to such equipment as the bailer wire and water level indicator. This equipment was rinsed with deionized water prior to and/or subsequent to sampling at each location. Groundwater sample containers, trip blanks, and deionized water used to prepare the necessary QA/QC control blanks were supplied by the laboratory.

Prior to all field activities, on each day of sampling, a field blank was prepared using laboratory supplied deionized water (Table 22). The water was poured over and/or through the sampling equipment (i.e., a bailer and bailer wire) and collected in appropriately labelled sample containers. A blank of the laboratory supplied deionized water was also prepared by pouring the water directly into laboratory supplied sample containers. The deionized water blank was labelled as any other

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sample submitted for analysis to ensure its purity (Table 22). Trip blanks, supplied by the laboratory, accompanied all sample shipments submitted for volatile organic compound analysis (Table 22).

At the initiation of the sampling program static water level measurements were collected from each monitoring well using an electronic water level indicator. Each well was then purged of approximately three calculated well volumes of water, or bailed dry, using a dedicated, stainless steel or teflon bailer suspended by teflon coated wire. Field measurements of pH, temperature, and specific conductivity were performed on each purged volume at the time of sampling (see Purge Data Sheets contained in Appendix C). All purge water was contained in 55-gallon drums and stored at the Facility.

Following the purging activities at each well, groundwater samples were obtained with the same dedicated bailer used for purging. All samples were transferred directly from the bailer to the appropriately labelled sample containers with the exception of those samples to be analyzed for dissolved metals. Dissolved metal samples were first filtered using dedicated, 0.45 micron disposal filters. All samples and blanks were packed on ice immediately following collection and shipped to Analytikem Laboratiories for analyses.

3.5.1 Area 1 - Chemical Storage Area

A total of twelve groundwater samples, including one field duplicate, were collected from the eleven monitoring installed in Area 1 (Figure 9). Each of the samples collected were submitted to Analytikem Laboratories for one or more of the following parameters: VOCs, BNAs, BNCs, TPH, PPL metals, total dissolved solids (TDS), and pH (Table 23).

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3.5.2 Area 2 - Waste Solvent Storage Tank

Two groundwater samples (includes one field duplicate) were collected from Area 2 monitoring well WT-01 (Figure 9). The two samples were submitted to Analytikem Laboratories for analysis of one or more of the following parameters: VOC, BNC, TPH, and PPL metals, (Table 23).

3.5.3 Area 3 - Waste Oil/Solvent Storage Tanks

One groundwater sample was collected from Area 3 monitoring well OS-01 (Figure 9). This sample was submitted to Analytikem Laboratories for analysis of VOCs, BNAs, TPHs, and PPL metals (Tables 23).

3.5.4 Area 4 - Jet Fuel Storage Tanks

Groundwater sampling not conducted in Area 4.

3.5.5 Area 5 - Hazardous Waste Storage Area

Groundwater sampling not conducted in Area 5.

3.5.6 Area 6 - Powerhouse Fuel Oil Storage Tanks

Groundwater sampling not conducted in Area 6.

3.5.7 Area 7 - Foundry Storage Area

Groundwater sampling not conducted in Area 7.

3.5.8 Area 8 - Plant 4 Receiving Area

Groundwater sampling not conducted in Area 8.

3.5.9 Area 9 - Plant 5 (East)

Groundwater sampling not conducted in Area 9.

3.5.10 Area 10 - Fuel Oil Storage Tanks

Groundwater sampling not conducted in Area 10.

3.5.11 Area 11 - Western Drainage Ditch and Boiler Blowdown Outfall

Groundwater sampling not conducted in Area 11.

3.5.12 Area 12 - Equalization Ditch

Groundwater sampling not conducted in Area 12.

3.5.13 Area 13 - Eastern Drainage Ditch

Groundwater sampling not conducted in Area 13.

3.5.14 Background Well

One groundwater sample was collected from the "background" monitoring well BK-01 for baseline groundwater conditions at the Facility. Groundwater sample BK-01A-01 was submitted to Analytikem Laboratories for analysis of VOCs, BNAs, TPHs, and PPL metals (Table 23).

4.0 GEOLOGIC AND HYDROLOGIC SETTING

Geologic and hydrologic data, specific to the Facility, was obtained as part of this investigation. An evaluation of this data along with the regional setting is presented in the following sections.

4.1 PHYSIOGRAPHY

The Allied Teterboro Facility is located in the Piedmont physiographic province. This province is characterized by gently rolling surfaces that slope gradually from the highlands in the north to the coastal plain in the south.

In the immediate vicinity of the Allied Teterboro Facility the topography is characterized by low lying tidal mashlands. Although the land occupied by the Facility has been regraded and paved, boring and survey data indicate the underlying presence of the marshlands and that surface elevations remain less than 10 ft above the sea level.

4.2 GEOLOGY

4.2.1 Regional Setting

The Allied Teterboro Facility, located in the Hackensack River basin, is underlain by Jurrasic and Trassic aged rocks of the Newark Group as well as glacial deposits of Pleistocene age.

The rocks of the Newark Group consist of three formations, referred to as the Stockton, Lockatong and Brunswick. The Stockton Formation is primarily composed of a light colored arkosic sandstone interbedded with lesser amounts of red sandstone and shale. The thickness of the Stockton Formation is reported to be 5000 ft in the vicinity of the Delaware River but thins drastically in the Hackensack River basin area.

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The Lockatong Formation overlies the Stockton and is composed of alternating layers of argillites and limestone. The thickness of this formation decreases from approximately 3,450 ft in southern New Jersey to 90 ft in northern New Jersey.

The Brunswick Formation overlies both the Lockatong and Stockton Formation, and is considered to be the bedrock of the Hackensack River basin. The Brunswick is comprised of alternating layers of reddish-brown sandstones, mudstones and conglomerates. The thickness of the Brunswick is thought to be 6000 ft in the area south of the Hackensack River basin.

The glacial deposits of Pleistocene age overlie the Brunswick Formation. These unconsolidated deposits of sand, gravel, silt and clay, were deposited during the last glacial episode (Wisconsin). The thickness of these deposits ranges from 25-300 feet.

Organic rich deposits of Holocene aged sand, gravel, silt, clay, and peat overlie the glacial deposits. The Holocene deposits range in thickness from approximately 10 ft to 50 ft.

4.2.2 Local Setting

Stratigraphic data regarding the sediments underlying the Allied Teterboro Facility was provided by and limited to the shallow subsurface soil borings advanced during this investigation. The maximum depth attained in any of the borings was 12.5 feet. A cross section of the shallow soil stratigraphy at the site is shown on Figure 10.

Soil borings revealed the Facility to be underlain by 3 to 12 ft of structural fill. The fill is primarily composed of a brown, coarse to fine grained sand, with lesser amounts of silt and gravel. The thickness of the fill material is greatest in the vicinity of the Powerhouse Fuel Oil Storage Tanks (Area 6) in the western portion of the Facility.

The organic rich Holocene sediments are present beneath the fill at various locations throughout the Facility. These deposits consist of sand, clay, and peat, and generally occur 2-3 ft thick in the study area.

Unconsolidated varved deposits, believed to be Pleistocene in age, underlie the organic rich sediments. These deposits are generally encountered 4-6 ft below grade and are almost entirely comprised of a dark greenish gray to dark gray clay. Although several clay samples revealed the presence of clastic-rich interbeds (dark gray to gray, medium to fine grained, silty sand) they could not be traced from one boring to another and are therefore believed to be laterally discontinuous. Local drillers logs indicate that the thickness of the varved sediments is as much as 160 ft in the vicinity of the Allied Teterboro Facility.

4.3 HYDROGEOLOGY

Underlying the Allied Teterboro Facility, the surface of the water table generally occurs 1-3 ft below ground surface. The occurrence of the shallow groundwater aquifer appears to be restricted to those sediments (fill and Holocene organic rich deposits) overlying the relatively impermeable varved Pleistocene clays. Piezometric surface maps, produced from static water level measurements (Table 24) obtained on 12 April, 17 April and 8 May, are shown in Figures 11, 12, and 13, respectively.

Although the groundwater surface contours are generalized, and based only on data obtained during this investigation (Table 24), the contour configuration suggests that in general groundwater flow radiates outward (i.e., west, south, and east) from a central high located to the southeast of the Chemical Storage Building (Figures 11, 12, and 13). The groundwater

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gradient, although locally steep, is generally shallow suggesting that lateral groundwater movement is slow. The vertical component of flow is believed to be restricted by the underlying clay.

Monitoring well development data also suggests that groundwater flow in this area is slow as indicated by the fact that most wells were pumped dry prior to evacuation of three well volumes of water.

Recharge to this area appears to be limited to unpaved areas which would allow for infiltration of precipitation.

It should be noted that the hydrogeologic characteristics presently existing at the Allied Teterboro Facility are at least in part a modification and reflection of the excavation and regrading conducted for the installation of underground utilities, building foundations, and the french drain collection system.

5.0 SUMMARY OF ANALYTICAL RESULTS

The results obtained from analytical testing of soil, sediment, and groundwater samples collected at the Allied Teterboro Facility are presented in Sections 5.1, 5.2, and 5.3, respectively. In the following sections, the focus has been placed on those compounds detected at concentrations which exceed NJDEP action levels. QA/QC sample results are included on Tables 43 and 44.

5.1 ANALYTICAL RESULTS - SOIL

5.1.1 Area 1 - Chemical Storage Area

VOC analyses were performed on 17 samples collected in Area 1. Six of these samples were determined to contain VOC concentrations above the NJDEP soil action level (1 ppm) ranging between 1.1 and 69.5 ppm. In sample CS-09S-01, total VOCs were measured at 0.34 ppm, however, unknown compounds detected in the search for tentatively identified compounds (TICs) were estimated at a concentration of 8.04 ppm. The analytical results for each sample are summarized on Table 25 and presented in Figure 14.

The highest concentrations of VOCs to occur in Area 1 were detected in samples CS-03S-01 and CS-10S-01 at 69.5 and 14.3 ppm, respectively (Figure 14). Ethylbenzene, total xylene, toluene and 1,1,1-trichloroethane were detected in CS-03S-01 at concentrations of 5.8, 54, 8.2, and 0.48 ppm, respectively. Ethylbenzene, total xylene and tetrachloroethane were detected in CS-10S-01 at concentrations of 7.0, 5.4, and 1.9 ppm, respectively. The borings, from which these two samples were collected (CS-03 and CS-10) are located approximately 25 feet apart (Figure 14).

Ethylbenzene, total xylene, or toluene were not detected in any other sample obtained in Area 1. 1,1,1-trichloroethane, found in sample CS-03S-01 was, however, detected in samples CS-04S-01

(3.5 ppm) and CS-06S-02 (0.98 ppm), where total VOCs in both samples were above 1 ppm (Table 25). The borings (CS-04 and CS-06) from which these two samples were derived are located adjacent to boring CS-03 (Figure 14).

Elevated concentrations of total VOCs, detected in samples CS-06S-01 and CS-17A-01, are essentially attributed to the occurrence of methylene chloride at 1.2 ppm and 1.1 ppm, respectively. It should be noted, however, that methylene chloride was detected in the field blanks and nonagueous method blank (0.56 ppm) for sample CS-06S-01. Methylene chloride is a common laboratory contaminant.

BNCs were detected above the NJDEP action level (10 ppm) in sample CS-10S-01 (12.3 ppm) only. This sample also contained elevated levels of VOCs. BNCs detected include phenanthrene, anthracene, fluoranthene, benzo(a)anthracene, chrysene and pyrene (Table 25). TIC concentrations occurring above 10 ppm were found in samples CS-03S-01 CS-09S-01, CS-12S-02 and CS-17S-01 and were labelled as unknown compounds (Table 25). The distribution of semivolatile organic compound concentrations detected in Area 1 are shown in Figure 15.

Acid extractable compounds (AECs) were analyzed in three samples but not detected in any sample (Table 26). The AEC library search revealed, however, TICs at estimated concentrations of 133 ppm in CS-15S-01 and 19.4 ppm in CS-18S-01 (Figure 15).

The NJDEP soil action level for TPHs is 100 ppm. This value was exceeded in eight of the eleven samples analyzed with measured concentrations ranging from 130 to 4,400 ppm (Table 25). Although the distribution of TPHs in Area 1 (Figure 16) is not clearly discernible, the two samples with the highest TPH concentrations, CS-10S-01 (4,400 ppm) and CS-03S-01 (3,900 ppm), also contain elevated levels of VOCs.

PPL metals were analyzed in eight Area 1 samples (Table 27). Four of the samples contain one or more metals in concentrations exceeding the NJDEP soil action levels. CS-01S-01 contained cadmium at 8.9 ppm, above the action level of 3 ppm. Cadmium (37 ppm) is also elevated in CS-09S-01, along with mercury at 1.1 ppm, slightly above the action level (1 ppm). In CS-10S-01 cadmium was detected at 9.4 ppm. Copper was also detected in sample CS-10S-01, at 180 ppm versus the action level of 170 ppm. The last elevated PPL metal was a mercury concentration of 38 ppm in sample CS-08S-01.

In summary, soil containing VOCs, BNCs, and/or AECs which exceed the NJDEP soil action levels are predominantly found in borings CS-03 and CS-10 (Figures 14 and 15). Though some compounds were detected in other borings, the concentrations were close to action levels. TPHs were found ubiquitously throughout the area but were again concentrated at more elevated levels in borings CS-03 and CS-10 (Figure 16).

5.1.2 <u>Area 2 - Waste Solvent Storage Tank</u>

Soil samples collected from two (WT-03 and WT-04) of the four borings advanced in this area contained VOC concentrations above NJDEP soil action levels (Table 28 and Figure 14). The trichloroethene concentrations detected were 61 ppm and 12 ppm, in WT-04 and WT-03, respectively. Methylene chloride (0.42 ppm) and tetrachloroethene (0.48 ppm) were also detected in WT-03S-01. 1,1,1-trichloroethene (2.5 ppm) and tetrachloroethene (19 ppm) were detected in WT-04S-01.

Base neutral/acid extractable compounds (BNAs) were not detected above NJDEP action levels in any of the soil samples collected from the four borings (Figure 15). The library search on sample WT-03S-02, however, showed an estimated BNA TIC concentration of 58.3 ppm due to unknown compounds (Table 28).

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None of the samples collected in Area 2 for PPL metals analysis contained any metal concentrations exceeding NJDEP action levels (Table 28).

Total petroleum hydrocarbon levels at locations WT-02S-01 (1.5-2 ft) and WT-04S-02 (6.5-7 ft) were found to exceed the NJDEP soil action level of 100 ppm, with measured concentrations of 130 ppm and 4,900 ppm respectively (Figure 16). Petroleum hydrocarbons were either not detected or below 100 ppm in the remaining three samples (Table 28).

The data gathered in the former Waste Solvent Storage Tank area showed VOCs (particularly trichloroethene and tetrachloroethene) to be the compounds of potential concern. The highest concentration was reported in WT-04, closest to the former tank location, with lower concentrations in WT-03 (Figure 14). Total petroleum hydrocarbon concentrations were also found at elevated levels, with the highest measured value, again in boring WT-04 (Figure 16).

5.1.3 <u>Area 3 - Waste Oil/Solvent Storage Tanks</u>

Four borings were installed in the vicinity of the former Waste Oil/Solvent Tanks. Total VOC concentrations in the samples collected from these borings ranged from 0.48 ppm in OS-01S-01 to 105 ppm in OS-04S-01D (Table 29). Three of the four borings (four of five samples) exhibited VOC concentrations above the action level of 1 ppm (Figure 14). The range of VOC concentrations detected include: methylene chloride (0.48-0.81 ppm), toluene (0.69-19 ppm), m-xylene (7.8-37 ppm), o,p-xylene (5.3-25 ppm), ethylbenzene (0.13-17 ppm), tetrachloroethene (0.6-4.7 ppm), and 1,1,1-trichloroethane (0.53-1.6 ppm). It should be noted that a comparison of sample OS-04S-01 and duplicate OS-04S-01D showed differences in total VOC levels of approximately a factor of four.

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No BNCs or PPL metals exceeded soil action levels in the Area 3 samples (Figure 15). BNC TICs were, however, detected at an estimated concentration of 75.5 ppm in OS-04S-01D, but only at 6.9 ppm in OS-04S-01. In sample OS-01S-01, the BNC TICs were measured at a concentration of 14.8 ppm (Table 29).

Total petroleum hydrocarbons were detected in samples from each of the four boring locations (Table 29). Samples collected from only two locations, however, exceeded the 100 ppm action limit for TPHs in soil. These locations, including borings OS-01 (120 ppm) and OS-04 (580 ppm and 1,300 ppm in duplicate samples), are shown in Figure 16.

Polychlorinated biphenyls (PCBs) were detected in sample OS-04S-02 at a concentration of 2 ppm. This value falls below the NJDEP action level of 5 ppm for industrial areas. PCBs were not detected in the duplicate sample obtained at this location or in any other sample collected from Area 3.

In summary, elevated levels of VOCs were detected in the Waste Oil/Solvent Tank Area close to the former location of the tanks. Borings more removed from the former tanks location showed decreasing levels (OS-03) or no VOCs (OS-01) to be present (Figure 14). Other compounds detected were generally below action levels.

5.1.4 <u>Area 4 - Jet Fuel Storage Tanks</u>

Soil samples obtained from the twelve soil borings installed in Area 4 (Jet Fuel Storage Tank Area) were generally free of or contained only low levels of benzene, toluene, ethylbenzene and xylene (BTEX) (Table 30). At two sampling locations the NJDEP soil action level of 1 ppm for VOCs (including BTEX) was exceeded. Sample JF-08S-02 contained 1.6 ppm of total VOCs (BTEX) though sample JF-08S-01, at the same location but closer to the surface, was at acceptable levels (0.7 ppm). The second sampling location containing VOC concentrations above action levels was obtained from boring JF-03, located adjacent to boring JF-08. Sample JF-03S-01 was analyzed for both BTEX and VOCs. The BTEX results showed a combined BTEX level of 1.07 ppm while the VOC analysis for the same sample showed the same compounds at a level of 34 ppm. The reason for this difference is not known. The only other compound detected in the VOC analysis was methylene chloride.

No soil samples collected in Area 4 contained PAHs at levels which exceeded the action level of 10 ppm. BNC TICs listed as unknown compounds were, however, detected at levels of 22, 49 and 21 ppm in samples JF-09S-02, JF-11S-01, and JF-12S-01, respectively (Table 30).

Eleven of the 19 samples tested for total petroleum hydrocarbons exceeded the action level of 100 ppm. Compound concentrations ranged from not detected in six samples to 1900 ppm in JF-11S-01. No pattern was observed in the distribution of the TPH contamination (Figure 17).

The concentration of BTEX above action levels were limited to two samples obtained from two adjacent borings, JF-03 and JF-08. The TPH concentrations in the remaining surrounding borings are below action levels. As in Area 4, TPHs occur ubiquitously throughout the Facility.

5.1.5 Area 5 - Hazardous Waste Storage Area

Four of the six soil samples exhibited measured VOC concentrations (Table 31) above the NJDEP action level of 1 ppm (Figure 14). Three of the four elevated values are, however, attributed to methylene chloride which was also detected in the field and trip blanks. Methylene chloride was detected at 1.1 and 1.2 ppm, in the two samples collected from boring CP-01, and at 0.46 ppm in sample CP-02S-01. The fourth exceedance of the VOC action level was due to tetrachloroethene (3.6 ppm) which was detected in shallow soil samples obtained from boring CP-03.

No BNCs were found to exceed soil action levels at any of the three sampling locations (Figure 15). One BNC TIC concentration was estimated at 20 ppm in CP-02S-01 (Table 31).

Metal's were found to exceed action levels at boring CP-02 only, in sample CP-02S-01 (6-12 inches below grade). Metals that exceeded NJDEP action levels at this location included: antimony (83 ppm), arsenic (70 ppm), beryllium (6 ppm), copper (1400 ppm), mercury (1.1 ppm), nickel (310 ppm), and zinc (7400 ppm). Metals in all other samples were below action levels (Table 31).

5.1.6 <u>Area 6 - Powerhouse Fuel Oil Storage Tanks</u>

Samples obtained in the vicinity of the Powerhouse Fuel Oil Storage Tanks, for TPH analyses exhibited concentrations ranging from non-detected (14 samples) to 200,000 ppm in sample PH-11S-01 (Table 32). The highest concentrations were detected at boring PH-09, PH-10, and PH-11, ranging from 2,000 ppm at PH-10-02 to the 200,000 ppm mentioned above at PH-11S-01 (Figure 18). TPHs occurring at these locations were detected in both the shallow water table samples and deep samples (from a depth of 12 feet). Other samples exhibiting TPH concentrations above the action level of 100 ppm were PH-07S-02 (230 ppm), PH-13S-01 (500 ppm), and PH-13S-02 (210 ppm). Borings PH-08, -09, -10 and -11 are located adjacent to one another between the tank area and Plant 1. PH-13 is also located in this same general area, but is separated by an uncontaminated boring (Figure 18).

None of the samples analyzed for PAHs showed concentrations exceeding the NJDEP action level of 10 ppm, with the exception of sample PH-11S-01 where a total concentration of 37.4 ppm was measured (Table 33). PAH compounds detected include: napthalene (20 ppm), phenanthrene (7.4 ppm), and benzo(a)-anthracene (10 ppm). This sample also had the highest level of TPHs. Concentrations of PAHs plus BNC TICs of 11.86 ppm, 14.8 ppm and 10.5 ppm were detected in samples PH-07S-02, PH-12S-02 and PH-14S-01, respectively.

No VOCs or BTEX, or PCBs were detected in the samples analyzed for these compounds (Table 33).

5.1.7 Area 7 - Foundry Storage Area

No individual VOCs or BNCs or total BNAs were above NJDEP action limits for soil, in any of the six soil samples obtained from the former Foundry Storage area. However, total VOCs in FS-02S were 1.1 ppm if the methylene chloride concentration of 0.56 ppm is included. BNC TIC concentrations in surface samples obtained from FS-01S-01, FS-02S-01, and FS-03S-01 were 15.4 ppm, 127.6 ppm, and 9.64 ppm, respectively (Table 34). The BNC TIC concentrations were lower in each of the deeper samples (Figure 19).

Inorganic analysis showed mercury at elevated concentrations in one sample from each of the three boring locations. Samples FS-01S-01 and FS-02S-01, collected at 6-12 inches below grade, were found to contain mercury concentrations of 46 ppm and 4.6 ppm, respectively. Sample FS-03-02 also exceeded the action levels of 1 ppm, in the 18-24 inch interval, with a concentration of 98 ppm (see Table 34). No other metals were detected above action limits, in any of the samples.

Total petroleum hydrocarbons, exceeded the 100 ppm action limit in each sample (Table 34). Concentrations ranged from 310 ppm at sampling location FS-02S-01 to 7,700 at sampling location FS-03S-02 (Figure 20).

5.1.8 Area 8 - Plant Four Receiving Area

VOCs were not detected in either of the borings installed adjacent to the Plant 4 Receiving area. VOC TICs identified as unknown compounds (Table 35) were, however, detected at an estimated concentration of 10 ppm in sample PR-01S-02.

BNCs were not detected (two samples), or were below the action level (0.31 ppm in PR-02S-01), in three of the four samples analyzed (Figure 19). The fourth sample, PR-01S-02 contained a total BNC concentration of 14.6 ppm, slightly above the action level of 10 ppm. BNC TICs in this sample were at an estimated concentration of 38.6 ppm due primarily to the occurrence of unknown compounds and unknown hydrocarbon compounds. In PR-01S-01, unknown compounds (TICs) were detected at 15.5 ppm (Table 35).

All PPL metals detected at the boring locations, were found to be below action levels (Table 35).

Total petroleum hydrocarbons were detected at both sampling locations. Samples PR-01S-02 and PR-02S-02 exhibited TPH concentrations of 4,000 ppm and 150 ppm, respectively, above the 100 ppm action level (Figure 20).

5.1.9 Area 9 - Plant 5 (East)

Concentrations of VOCs, BNCs, and PPL metals were not detected above NJDEP action levels in soil samples collected from Area 9 on the east side of Plant 5 (Table 36 and Figure 19). The sum of all compound concenrations (BNCs plus BNC TICs) was 11 ppm in sample PL-01S-01 due to an estimated concentration of 9.7 ppm for unknown compounds and unknown hydrocarbon (TICs). This sample also contained 170 ppm petroleum hydrocarbon. All other TPH analysis results were below 100 ppm in Area 9 (Figure 20).

5.1.10 Area 10 - Fuel Oil Storage Tanks

Total petroleum hydrocarbon ahalyses performed on soil samples collected in Area 10 revealed concentrations exceeding action levels at six of the eight sampling locations. Concentrations ranged from 23 ppm to 10,000 ppm at location FO-01 and FO-03, respectively. Analytical results are presented in Table 37 and Figure 20.

Polynuclear aromatic hydrocarbons (PAHs) did not exceed action limits at any of the soil boring locations (Figure 19). The following compounds were, however, detected: phenanthrene, pyrene, and chrysene, at a maximum total concentration of 3.5 ppm in one sample (Table 37).

Benzene, toluene, and xylene (BTX) was below NJDEP action levels in all samples. At the two locations where it was detected, total concentrations ranged from 0.47 ppm at FO-03, to 0.17 ppm at FO-05.

5.1.11 Area 11 - Western Drainage Ditch and Boiler Blowdown Outfall

No soil samples collected in Area 11.

5.1.12 Area 12 - Equalization Ditch

No soil samples collected in Area 12.

5.1.13 Area 13 - Eastern Drainage Ditch

No soil samples collected in Area 13.

5.1.14 Background Boring

Minor concentrations of organic and inorganic compounds were detected in soil samples collected from the background boring located in the northern portion of the Facility.

No targeted compounds included in the VOC and BNC analyses were detected in the samples, with the exception of bis(2-ethylhexyl)phthalate (0.13 ppm), a common labortory introduced contaminant. The remaining contribution to the reported VOC and BNC concentrations are attributed to TICs detected in the library search. Of these TICs only the VOC TICs indicate a slightly elevated (above NJDEP action level of 1 ppm) level occurring at 2.7 ppm.

All reported metal concentrations occurring in the background samples were significantly less than the corresponding NJDEP action limit.

5.2 ANALYTICAL RESULTS - SEDIMENT

5.2.1 Area 1 - Chemical Storage Area

No sediment samples collected in Area 1.

5.2.2 Area 2 - Waste Solvent Storage Tank

No sediment samples collected in Area 2.

5.2.3 Area 3 - Waste Oil/Solvent Storage Tanks

No sediment samples collected in Area 3.

5.2.4 Area 4 - Jet Fuel Storage Tanks

No sediment samples collected in Area 4.

5.2.5 Area 5 - Hazardous Waste Storage Area

No sediment samples collected in Area 5.

5.2.6 Area 6 - Powerhouse Fuel Storage Tanks

No sediment samples collected in Area 6.

5.2.7 Area 7 - Foundry Storage Area

No sediment samples collected in Area 7.

5.2.8 Area 8 - Plant 4 Receiving Area

No sediment samples collected in Area 8.

5.2.9 Area 9 - Plant 5 (East)

No sediment samples collected in Area 9.

5.2.10 Area 10 - Fuel Oil Storage Tanks

No sediment samples collected in Area 10.

5.2.11 Area 11 - Western Drainage Ditch and Boiler Blowdown Outfall

Volatile organic compounds (VOCs) were not detected in any of the sediment samples collected along the Western Drainage Channel at the Allied Teterboro Facility. Numerous samples, including upstream samples, did exhibit BNC, PPL metal, and TPH concentrations above action limits (Table 39).

Total base neutral compound concentrations, exceeded the 10 ppm limit at three of the five sampling locations (WD-01, WD-03, and WD-04). It should be noted that WD-01 is the upstream or

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background sediment sampling location. BNC concentrations ranged from 4.1 ppm at WD-02 to 57.5 ppm at WD-03. The most commonly detected compounds found were: pyrene, fluoranthene, and phenanthrene. Other compounds including benzo(a)anthracene, benzo(b)fluoranthene, benzo(k) fluoranthene, and benzo(a)pyrene were also detected (Table 39).

The concentration of BNC compounds along the channel showed no consistent pattern between the upgradient and downgradient samples. As shown on Figure 21, total BNCs were at relatively high levels (16 and 24 ppm in duplicate samples) in the upstream sample. Values exhibited in samples collected from the channel adjacent to the Facility (57.5 ppm, 8.0 ppm and 39.2 ppm from upstream to downstream) were comparable to upstream levels and decreased to 4.1 ppm in the downstream sample. BNC TICs and individual BNC compounds each showed slightly different patterns, but none showed a net increase from upstream to downstream. Sediment data from streams and drainage ditches are often spatially quite variable. Samples collected at another time may well exhibit different characteristics as contaminants migrate down the channel.

PCBs (Aroclor 1248) were found in the duplicate upstream samples of WD-01 at levels of 320 ppm and 100 ppm, above the action level of 5 ppm for industrial properties. PCB concentrations along and downstream of the Facility were lower, with a maximum concentration of 1.6 ppm. The PCB contamination is most likely attributable to an off-site, upstream source.

The distribution of TPH contamination, like that of BNCs, exhibits variable concentrations along the channel. In this case, both the highest (5,300 ppm) and lowest (770 ppm) values were measured adjacent to the Facility. The upstream duplicate samples, with concentrations of 5,000 ppm and 4,500 ppm, were, however, close to the highest values. Given the high upstream values, it is unlikely that the Facility is a measurable source of TPHs to the Western Drainage Ditch.

PPL metals including cadmium, chromium, copper, lead, mercury, silver and zinc were all detected above action levels in one or more samples. Lead and mercury were at their highest levels in upstream samples WD-01 and WD-0ID (duplicate). The lead concentration in these two samples were 950 ppm and 1100 ppm, respectively, and the mercury concentration was at 1.2 ppm and 0.48 ppm. Cadmium (16 ppm), chromium (2,700 ppm), copper (3,300 ppm), and zinc (1,700) were by contrast highest in the downstream sample (WD-02). Silver (640 ppm) was at the highest concentration in the middle at WD-04. Figure 22 shows the distribution and concentration of metals along the ditch.

5.2.12 Area 12 - Equalization Ditch

The sediment sample collected from the equalization ditch did not contain VOCs, cyanide, or PCB's (Table 40).

A total BNC concentration of 842 ppm was detected from sediment sample EQ-01S-01 (Figure 21). Eleven compounds were identified in the sample and are listed on Table 40. A total petroleum hydrocarbon concentration of 38,000 ppm was also detected in this sample.

5.2.13 Area 13 - Eastern Drainage Ditch

Methylene chloride was the only VOC detected in samples collected along the Eastern Drainage Channel. It was detected at concentrations ranging from 0.54 ppm (ED-02) to 1.2 ppm (ED-01) in the upgradient sample where it exceeded the NJDEP Action Level for soil (Table 41). It was, however, also detected in the method blank for these samples.

Metals were detected at or above action levels at two of the three sampling locations. Cadmium was detected at the 3 ppm action level at location ED-02 (Figure 22). Silver and zinc were found above the action limits at Iocation ED-03, exhibiting concentrations of 61 ppm and 410 ppm, respectively (Table 41).

Total petroleum hydrocarbons were also detected above action limits at all three sampling locations, with concentrations of 240 ppm at ED-01, 2,600 ppm at ED-02, and 2,300 ppm at ED-03 (Table 41 and Figure 23).

5.2.14 Background Boring

No sediment samples collected from background boring.

5.3 ANALYTICAL RESULTS - GROUNDWATER

5.3.1 Area 1 - Chemical Storage Area

All groundwater samples (including one field duplicate) collected in Area 1 were submitted for analysis of volatile organic compounds. The total targeted VOC concentrations reported from these analyses indicate that seven of the twelve samples submitted exhibit elevated concentrations in excess of the NJDEP suggested guidance level (10 ppb). In all but one sample, the total VOC TIC concentrations (detected in the library search) were significantly less than those of the targeted VOCs (Table 42). In general, the majority of VOC groundwater contamination in Area 1 can be attributed to trans-1,2-dichloroethene and/or vinyl chloride. Sample CS-16A-01, however, exhibits 1,1-dichloroethane as the major contributor (Table 42).

Elevated concentrations of VOCs in groundwater samples collected in the Chemical Storage area are essentially centered around a high at well location CS-16 (46,641 ppb). Concentrations generally decrease away from this center in all directions (Figure 24). This radial distribution is in agreement with the radial groundwater flow pattern depicted by groundwater elevation contours in Figures 10, 11 and 12.

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Total semivolatile organic compound (i.e., base neutral/acid extractables) concentrations were not detected in excess of the NJDEP suggested action level (50 ppb) in any of the groundwater samples collected from Area 1 (Figure 25). In 6 of the 11 samples analyzed for BNAs, however, the 50 ppb action level was exceed by BNA TICs identified in the library search (Table 42).

Groundwater samples collected from Area 1 monitoring wells were not analyzed for PPL metals.

Results of total petroleum hydrocarbon analyses performed on samples CS-12A-01 and CS-17A-01 reveal that neither of the samples contained detectable levels of petroleum hydrocarbons (Table 42).

5.3.2 Area 2 - Waste Solvent Storage Tank

Two groundwater samples (includes one field duplicate) were collected from Area 2 monitoring well WT-01. VOC analysis, performed on sample WT-01A-01 only, revealed a total VOC concentration (1437 ppb) in excess of the NJDEP suggested guidance level of 10 ppb (Figure 24 and Table 42). Of this total, the two major contaminant contributors are vinyl chloride (680 ppb) and trans-1,2-dichloroethene (640 ppb). An additional 10 ppb is attributed to VOC TICs identified in the library search (Table 42).

Semivolatile organic compounds (i.e., base neutral/acid extractables) were not detected in excess of the NJDEP suggested action level (50 ppb) in sample WT-01A-01 (Figure 25 and Table 42). Field duplicate sample, WT-0IA-0ID, was not analyzed for BNAs.

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Analytical results obtained from PPL metals analyses revealed the general absence or low concentration of metals in groundwater collected from Area 2. No compound was detected at a concentration exceeding the NJDEP suggested action level for that metal (Table 42).

Petroleum hydrocarbons were not detected in either of the two groundwater samples obtained from monitoring well WT-01 (Table 42).

5.3.3 Area 3 - Waste Oil/Solvent Storage Tanks

Only one groundwater sample was collected in Area 3. VOC analysis of sample OS-01A-01, collected from monitoring well OS-01 revealed the highest concentration of total VOCs (250, 065 ppb) of any of the groundwater samples collected during this investigation (Figure 24). As described for Areas 1 and 2, the two major contaminants contributing to VOC contamination in sample OS-01A-01 are trans-1,2-dichloroethene and vinyl chloride detected, at 180,000 ppb and 20,000 ppb, respectively (Table 42).

Total semivolatile organic compounds, including base neutral/acid extractables, were also detected in excess of the NJDEP suggested action level (50 ppb) in sample OS-01A-1 (Table 42). This sample, exhibiting 377 ppb total BNAs, was the only groundwater sample collected to exceed the suggested action level (Figure 25). Sample OS-01A-01 also contained the highest estimated total BNA TIC concentration at 6142 ppb (Table 42).

PPL metals analysis performed on the OS-01 sample revealed the general absence or low concentration of metals in groundwater. Chromium, detected at a concentration of 52 ppb in sample OS-01A-01, was the only metal detected at a concentration to exceed the NJDEP suggested action level of 50 ppb (Table 42).

Petroleum hydrocarbons were not detected in sample OS-01A-01 (Table 42).

5.3.4 Area 4 - Jet Fuel Storage Tanks

No groundwater samples collected in Area 4.

5.3.5 Area 5 - Hazardous Waste Storage Area

No groundwater samples collected in Area 5.

5.3.6 Area 6 - Powerhouse Fuel Storage Tanks

No groundwater samples collected in Area 6.

5.3.7 Area 7 - Foundry Storage Area

No groundwater samples collected in Area 7.

5.3.8 Area 8 - Plant 4 Receiving Area

No groundwater samples collected in Area 8.

5.3.9 Area 9 - Plant 5 (East)

No groundwater samples collected in Area 9.

5.3.10 Area 10 - Fuel Oil Storage Tanks

No groundwater samples collected in Area 10.

5.3.11 Area 11 - Western Drainage Ditch and Boiler Blowdown Outfall

No groundwater samples collected in Area 11.

5.3.12 Area 12 - Equalization Ditch

No groundwater samples collected in Area 12.

5.3.13 Area 13 - Eastern Drainage Ditch

No groundwater samples collected in Area 13.

5.3.14 Background Well

None of the targeted VOCs were detected in groundwater sample BK-01A-01 (Figure 24). Acetone, reported in the library search (VOC TIC) at an estimated concentration of 170 ppb, was the only VOC compound detected (Table 42).

The only semivolatile organic compound (i.e., base neutral/acid extractables) to be detected in the background groundwater sample was bis(2-ethylhexyl)phthalate (11 ppb), a common laboratory contaminant (Figure 25 and Table 42). An "unknown compound", detected in the BNA library search (BNA TIC), was reported at an estimated total concentration of 490 ppb.

Inorganic compound analyses reveal that no metals were detected at concentrations exceeding the NJDEP suggested action level. With the exception of zinc (27 ppb), no metals were detected (Table 42).

Petroleum hydrocarbons were not detected in groundwater sample BK-01A-01 (Table 42).

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6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 AREA 1 - CHEMICAL STORAGE AREA (SOIL AND GROUNDWATER)

6.1.1 Conclusions

The nature and extent of soil and groundwater contamination in Area 1 was well defined by the analytical sampling program. The primary soil contaminants detected in Area 1 are VOCs including toluene, ethylbenzene, total xylene, 1,1,1-trichloroethene and tetrachloroethane. Though other VOCs were detected they were present at low levels or in a single sample. Methylene chloride was detected at elevated levels in several samples, but was also noted in field and method blanks, indicating that the compound is not indicative of contamination in Area 1.

The contaminants in the groundwater are also primarily VOCs, though the compounds detected were, more varied and widely distributed. In addition to the toluene, ethylbenzene, total xylenes, 1,1,1-trichloroethene and tetrachloroethene which were detected in the soils, vinyl chloride, 1,1-dichloroethane, and trans-1,2-dichloroethene were commonly detected in the groundwater. The contamination in the groundwater was centered around wells CS-15 and CS-16.

The VOC contamination in the soil is essentially centered at boring locations CS-03 and CS-10, with lesser amounts detected in adjacent borings CS-04 and CS-06. Data from surrounding borings (i.e., CS-01, -02, -05, -07, -08, and -11) indicate the areal extent of VOC contamination is limited. Although boring CS-06 contains total VOC concentration of up to 1.2 ppm, it may be considered as part of the area where VOCs are below action levels, due to the fact that the total VOC value was associated with methylene chloride which was also found in the field and method blanks. Connecting for the methylene chloride results in a total VOC and TICs of 0.25 ppm.

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BNCs were also detected in the soil in Area 1. The highest value for total BNCs, 12.3 ppm, was only slightly above the action level of 10 ppm. This contamination was found at boring CS-10 one of the two borings with the highest levels of VOCs.

Metals were also detected in the soil at concentrations above action levels in isolated samples. Cadmium was detected in three samples at levels of 8.9 ppm, 9.4 ppm, and 37 ppm (action level 3 ppm) and mercury was detected in one sample as high as 38 ppm (action level 1.0 ppm). The mercury value, in boring CS-08 is surrounded by borings where no mercury was detected. Two of the borings where cadmium is at potentially elevated levels, CS-09 and CS-10, are adjacent but the third boring CS-01 is not. CS-10 is the boring with elevated VOCs and BNCs. The above indicates very limited metal contamination or isolated "hits".

TPHs were also detected in the soil at the highest concentrations in borings CS-03 and CS-10. Although TPHs are found at elevated levels in other Area 1 borings, the elevated TPHs appear to be attributed to the ubiquitous presence of near surface, oil stained soils, possibly related to the former practice of oiling driveways and parking areas to minimize dust. The TPHs may also be attributable to contamination of the fill material, prior to its placement at the Facility.

6.1.2 Recommendations

No additional study is required in Area 1. A Cleanup Plan for the Allied Teterboro Facility is being developed addressing the soil and groundwater contamination (including VOCs and BNCs) in the vicinity of borings CS-03, -04, -06 and -10 and wells CS-15 and -16. Depending on the type of action(s) proposed, remediation of metals and TPHs in soil may also occur. The Plan will evaluate groundwater treatment alternatives, which will also remediate the soils, as well as a soil treatment (excavation) alternative.

The isolated detection of metals in Area 1 will not be addressed in the Cleanup Plan. Area 1 is already paved and therefore eliminates the potential for exposure to metal contaminants. In addition, the metal concentrations detected above action levels were still quite low and generally close to the action levels. The sampling distribution also showed that metal contamination is of limited areal extent.

TPHs will not be addressed by the Cleanup Plan due to the fact that their occurrence can be related to the prior oiling of roadways and/or placement of potentially contaminated fill. In addition, TPHs were not detected in groundwater samples collected from Area 1 monitoring wells (see Section 5.3). As discussed in Section 5, TPHs are found in virtually every area of the site. However, depending on the type of remediation selected, cleanup of TPHs may occur as a consequence of the remediation.

6.2 AREA 2 - WASTE SOLVENT STORAGE TANK (SOIL AND GROUNDWATER)

6.2.1 Conclusions

VOCs are present in Area 2 at levels above NJDEP soil and groundwater action levels. Trichloroethene (61 ppm), tetrachloroethene (19 ppm), and 1,1,1-trichloroethene (2.5 ppm) are each present in soils at boring location WT-04 at concentrations above the action level. Trichloroethene (12 ppm) was also detected in a soil sample at boring WT-03, above the action level, but at lower concentrations than in WT-04. Borings WT-01 and WT-02, which did not contain VOCs above action levels serve to define the lateral extent of VOC contamination in soils in Area 2.

A water sample from the one well installed in Area 2, WT-1, had elevated levels of VOCs detected, even though the soil sample at this location did not. Vinyl chloride, 1,1-dichloroethane and trans-1,2-dichloroethene were each detected at elevated levels in the well.

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BNAs and PPL metals were not detected above action levels in Area 2. BNA TICs, detected above a concentration of 10 ppm in soils, are not considered to pose a risk or require cleanup at this time due to the "unknown" nature of such compounds.

TPHs were found above the action level (100 ppm) in two soil samples collected from this area. In boring WT-02, a level of 130 ppm was detected, and in WT-04 the level was 4,900 ppm. WT-04 also exhibited the highest level of VOCs in soil.

6.2.2 Recommendations

The existing soils data are adequate to define the nature and extent of soil contamination in Area 2. However, additional groundwater data on VOCs is needed to define the extent of contamination in the groundwater. It is recommended that additional groundwater data be obtained in Area 2 to define the extent of groundwater contamination. Preparation of a Cleanup Plan for Area 2 soils and groundwater will, therefore, be postponed until the groundwater evaluation is completed. At such time, a combined soil and groundwater remediation program may be appropriate. It should be noted that any additional studies in Area 2 will need to consider the presence of underground utilities in this area, which will limit potential boring locations.

The TPH contamination at boring WT-04 will not be specifically addressed but may occur concurrent with VOCs cleanup. TPH contamination appears to be ubiquitous at the Facility and is likely to be associated with the placement of fill material with TPH or the past oiling of roadways. The risk associated with the TPH contamination at the Facility is minimal due to the fact that the soils are covered with pavement.

6.3 AREA 3 - WASTE OIL/SOLVENT STORAGE TANK (SOIL AND GROUNDWATER)

6.3.1 Conclusions

VOCs are the primary contaminants exceeding the action levels in soil and groundwater in the area of the former Waste Oil/Solvent Storage Tank. Soil samples from borings OS-02 and OS-04 exhibit elevated levels of toluene, ethylbenzene and xylene at depths of 10-10.5 and 4-4.5 feet, respectively. Boring OS-03 also showed somewhat elevated levels of VOC's, though at concentrations much lower than in OS-02 and OS-04. VOC contamination was not detected in boring OS-01, however the water sample from the well installed at that location contained the highest levels of VOCs measured in any water sample from the site.

The existing borings are adequate to define the extent of soil contamination in Area 3, but additional data is needed to define the extent of groundwater contamination by VOCs. A supplemental sampling plan will be prepared for this purpose. Although an additional boring, located between OS-04 and OS-01 would help to better define the lateral extent of soil contamination, the presence of underground utilities limits the potential for additional drilling in that area.

Detected concentrations of BNCs, PPL metals and PCBs were all below NJDEP action levels in samples collected in Area 3.

TPHs were detected in the soil samples from bbring OS-04, above action limits. The VOC analysis from this location also showed the highest VOC levels in Area 3. At boring OS-01, where the TPH concentration also exceeded soil action levels, the concentration was only 120 ppm. As previously stated, TPHs are found in soils throughout the site.

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6.3.2 Recommendations

No additional characterization of the former Waste Oil/Solvent Storage Tank area is needed to evaluate soil contamination. The extent of soil contamination is defined by the distribution of the existing borings. Due to limited access from buildings and utilities, additional "safe" boring locations would be difficult to locate. However, additional groundwater data is needed to define the extent of contamination.

Cleanup of soils to reduce the level of VOC contamination is recommended. However, preparation of a Cleanup Plan for the soils will be postponed until a joint soil/groundwater Cleanup Plan can be prepared, after additional groundwater sampling is performed.

No remediation for TPHs is recommended based on their ubiquitous nature at the Facility and the fact that TPHs are not leaching into the groundwater (see Section 5.3).

6.4 AREA 4 - JET FUEL STORAGE TANKS (SOIL)

6.4.1 Conclusions

The twelve borings completed in Area 4 were sufficient to characterize the extent of soil contamination. In only two samples, JF-08S-02 and JF-03S-01, was BTEX detected above the action level of 1 ppm and in both cases the level of exceedance was minimal. JF-08S-02 contained a total BTEX concentration of 1.6 ppm and JF-03S-01 a concentration of 1.07 ppm. These results not withstanding, a discrepancy was found to exist between the concentrations detected in the total VOC analysis of JF-03S-01 (BTEX detected at 34 ppm) versus the value measured in the BTEX analysis (BTEX detected at 1.07 ppm).

PAHs detected in the soils in this area are below action levels and therefore do not require remediation.

TPHs were found in Area 4, confirming the results obtained during previous remediation of the tank area. As stated in the Field Sampling Plan, the TPHs contamination does not appear to be associated with the former tanks. As stated elsewhere in this report the presence of TPHs in soil is widespread at the Facility.

6.4.2 Recommendations

It is recommended that additional soil samples be collected in and around the area occupied by soil boring JF-03 in order to verify the results obtained from previous BTEX and total VOC analyses. The need for remediation in this area will be based on the results obtained from additional soil sampling and will focus on boring location JF-03. Excavation at JF-08 will not be included for the following reasons: the measured level of 1.6 ppm only minimally exceeds the action level of 1 ppm; the area is protected by a layer of asphalt; and BTEX was only detected in the deep sample at this location. No remediation or resampling for TPHs will be evaluated in the Cleanup Plan.

6.5 AREA 5 - HAZARDOUS WASTE STORAGE AREA (SOIL)

6.5.1 Conclusions

Metals and VOCs were detected at levels above action levels in several samples. With the exception of sample CP-03S-02, the VOC concentrations above 1 ppm are, however, attributable to methylene chloride which was also found in the field and trip blanks. In CP-03S-02 tetrachloroethene was detected at a concentration of 3.6 ppm.

BNCs were only detected below action levels.

All metal concentrations exceeding the action levels were detected in surface sample CP-02S-01. The deeper sample at this location and adjacent locations did not indicate the presence of elevated metal concentrations, i.e. an isolated anomaly.

The presence of tetrachloroethene in sample CP-03S-02 indicates a potential need for limited remediation. Data from samples CP-03S-01 and OS-01S-01 indicate the zone of contamination to be thin and restricted but the areal extent is not adequately defined by the current borings.

The extent of elevated metal concentrations is limited by adjacent buildings and borings. It is likely, based on the variety of metals in the samples, that the sample included a piece of slag or similar material. Additional near surface soil testing in this area would, however, help confirm or contradict this hypothesis.

6.5.2 Recommendations

Additional soil samples will be collected and analyzed for inorganic compounds to evaluate the integrity of results obtained from samples previously collected in Area 5. A supplemental sampling plan will be prepared, if necessary, based on the results of these additional samples. Cleanup of VOC contaminated soils are not recommended in this area due to the low levels detected, and their limited areal extent. However some remediation may occur in conjunction with groundwater clean-up in the former Waste Oil/Solvent Tank Area (Area 3). These are contiguous areas and the groundwater in the Waste Oil/Solvent Tank Area is recommended for additional investigation activity.

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6.6 AREA 6 POWERHOUSE FUEL OIL STORAGE TANKS (SOIL)

6.6.1 Conclusions

TPH contamination surrounding the Area 6 Fuel Oil Storage Tanks was well defined by the distribution of borings installed during this investigation. Unlike most of the TPH contamination at the Facility, the Area 6 investigation indicates a limited zone of contamination and a likely source (leakage or spillage from the tanks). These findings are supported by the high concentrations detected in many of the samples, such as PH-11S-01 (200,000 ppm). Contamination appears limited to the area between the oil tanks and Plant 1. Borings PH-17 and PH-18 demonstrate that contamination has not migrated to beneath Plant 1.

Elevated levels of PAHs were also detected in sample PH-11S-01. No other samples collected in Area 6 exceeded action levels for PAHs.

6.6.2 Recommendations

A project to replace the underground fuel tanks in Area 6 is planned by Allied-Signal Aerospace. A Cleanup Plan to excavate and remove the TPH contaminated soils will be developed, and implemented in conjunction with tank removal and replacement. A site-specific TPH action level of 1000 ppm is recommended for this area due to the widespread occurrence of TPHs at the Facility. This Cleanup Plan may be prepared separately from other Cleanup Plans to facilitate this process. Tank replacement is currently planned for the summer of 1990.

Remediation for TPHs would include the remediation of soil with PAHs above action levels since the soils are co-located. It is recommended that post excavation sampling be limited to TPHs since the PAHs were found only in samples with high levels of TPHs.

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6.7 AREA 7 FOUNDRY STORAGE AREA (SOIL)

6.7.1 Conclusions

Mercury is the potential contaminant in the former Foundry Storage Area. At each of the three boring locations, one soil sample exhibited a mercury concentration above the action level of 1 ppm. The results, however, were quite variable. The existing borings are approximately 150 feet apart and do not define the extent of potential mercury contamination within Area 7.

In sample FS-02S-02, the total VOC concentration was 1.1 ppm, of which methylene chloride accounted for 0.56 ppm. Although methylene chloride is a common laboratory contaminant and was detected in several other quality assurance samples, it was not detected in the quality assurance samples analyzed with FS-02S-02. Given that the total value of 1.1 ppm is essentially equal to the action level of one and the likelihood that methylene chloride is not attributable to the Facility (but rather to laboratory contamination), VOCs are not considered as a contamination problem in Area 7.

TPHs were found at concentrations ranging from 310 to 7,700 ppm in each sample collected in Area 7. These results again demonstrate the widespread occurrence of TPHs at the Facility and their likely association with past road oiling activities or the placement of oil contaminated fill.

6.7.2 Recommendations

Due to the fact that Area 7 is currently paved with asphalt it is believed that the TPH contamination in the soil poses no risk. It is therefore recommended that no further sampling or remediation be conducted in Area 7 with respect to TPHs. Based on the results of inorganic analysis, however, it is recommended that additional borings be installed to adequately delineate the extent of the mercury contamination in this area and the need for remediation.

6.8 AREA 8 - PLANT FOUR RECEIVING (SOIL)

6.8.1 Conclusions

TPHs and one BNC concentrations were reported to exceed the NJDEP soil action levels. The TPHs concentrations in the Area 8 soil appear to be a continuation of the general sitewide TPH contamination. The maximum TPH concentration detected in Area 8 is 4000 ppm.

The one BNC concentration reported to exceed the 10 ppm action level was detected in sample PR-01S-02 (14.6 ppm). Of this total, 10 ppm was due to the presence of N-Nitrosodiphenylamine. Sample PR-01S-02 also contained the TPH concentration of 4000 ppm. All other compounds were below action levels (Table 35).

6.8.2 Recommendations

The installation of one additional boring, adjacent to PR-01, is recommended to adequately evaluate if the BNC contamination is an isolated occurrence or represents a need for remediation. These samples will also be analyzed for TPH due to the close proximity to elevated TPH ccncentraticns found in Area 10. No additional sampling for VOCs or PPL metals is warranted in this area, as indicated by the low values detected during this investigation. If additional sampling does not reveal elevated (above action levels) BNC concentrations, no remediation is warranted in this area.

A supplemental site investigation plan will be prepared for Area 8.

6.9 AREA 9 - PLANT 5; EAST SIDE (SOIL)

6.9.1 Conclusions

VOCs, BNCs and PPL metals detected in Area 9 samples were reported to be present at concentrations below the NJDEP action levels. Although the combination of BNCs and BNC TICs in sample PL-01S-01 was 11 ppm, an estimated concentration of 9.75 ppm is attributed to unknowns detected in the library search.

Total petroleum hydrocarbons in sample PL-01S-01 were detected at a concentration of 170 ppm. This is above the action level of 100 ppm, but is attributable to the sitewide presence of TPHs in the soil.

6.9.2 Recommendations

Based on the level of contaminants detected, Area 9 should be excluded from additional sampling and remediation. No Cleanup Plan is proposed for Area 9.

The TPH value above action levels is attributable to the sitewide presence of potential oil contaminated fill and no remediation of soil containing TPHs is recommended.

6.10 AREA 10 - FUEL OIL STORAGE TANKS (SOIL)

6.10.1 Conclusions

All analytical compounds detected in Area 10 soils were below NJDEP action levels, with the exception of TPHs. TPHs were measured at levels up to 10,000 ppm. These levels were exceeded only by those reported in samples collected from the Powerhouse

Fuel Oil Storage Tank area. Given the former presence of oil storage tanks in Area 10, and the high elevated levels of TPHs, it appears that some of the soil contamination may be attributable to spillage or leakage from the tanks.

6.10.2 Recommendations

In conjunction with additional sampling in Area 8, TPH analyses will be performed to better define the eastern extent of TPH contamination in Area 10. Due to the widespread presence of TPHs at the Facility, it will not be possible to remove all soils in this area to meet the 100 ppm action level. The Cleanup Plan will therefore recommend excavation of those soils in Area 10 which exhibit greater than 1000 ppm TPH concentrations, including soils surrounding borings FO-03 and FO-05.

6.11 AREA 11 - WESTERN DRAINAGE DITCH (SEDIMENT)

6.11.1 Conclusions

BNCs, several PPL metals, PCBs and TPHs are all present at elevated levels in the Western Drainage Ditch. No VOCs were detected. The distribution of the contaminants in the sediments were such that no specific sources could be identified. Many potential sources including the Allied-Signal Facility, the adjacent railroad and highway, and upgradient industries are possible. The occurrence of TPHs, BNCs and PCBs all appear to be related to off-site sources due to relatively high upgradient values. Each metal detected presents its own distinct distributicn pattern with some at higher ccncentraticns upgradient and some at higher concentrations downgradient of the Facility. Given the inherent time and spatial variability in sediment samples it would be difficult if not impossible to identify a specific metal as originating from the Facility.

6.11.2 Recommendations

Although the sediments are contaminated above action levels, neither an additional investigation nor a Cleanup Plan is warranted. Contamination in the Western Drainage Ditch does not appear to be associated with the Facility and in all likelihood is attributable to off-site activities.

6.12 AREA 12 - EQUALIZATION DITCH (SEDIMENT)

6.12.1 Conclusions

The Equalization Ditch is actually a pipeline connecting Areas 11 and 13. Sediments in the sewer were sampled and contained BNCs and TPHs above action limits. The impact of these sediments, on the drainage channels, if any, was not measurable.

6.12.1 Recommendations

No additional sampling of the Egualization Ditch is recommended based on the lack of measureable impact of the Area 12 contamination on the drainage channels. In addition, no Cleanup Plan will be prepared based primarily on the lack of impact and secondarily on the technical difficulty which would be associated with removing and replacing the sewer line. As shown on Figure 9, the ditch extends under several buildings, which would make replacement of the sewer very difficult. The sediments in the Equalization Ditch could possibly be removed using high pressure water hoses, but capture and treatment of the soils would be difficult and may cause potential adverse impacts on the adjacent channels.

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6.13 AREA 13 - EASTERN DRAINAGE CHANNEL (SEDIMENT)

6.13.1 Conclusions

VOC concentrations identified in Area 13 samples are attributable to laboratory contamination (methylene chloride) and are not Facility related. Two metals, silver and zinc were detected above action levels in one sample (ED-03), located in the ditch at the center of the Facility. Up- and down-gradient samples were, however, below action levels. TPHs were above action levels in upgradient, mid-site, and downgradient samples.

The distribution of compounds in the Eastern Drainage Channel do not indicate that they are related to the Facility and do not require remediation or additional sampling.

6.13.2 Recommendations

No additional investigation of the Eastern Drainage Channel is recommended based on the relatively low levels of contaminants detected and the lack of evidence that they are Facility related. Similarly, no Cleanup Plan will be prepared for Area 13.

6.14 SUMMARY

Recommendations to prepare a Cleanup Plan, perform additional sampling, and/or eliminate an area from further study have been prepared for each of the 13 areas evaluated in this investigation. Table 45 lists each area and the associated action.

TABLE 1
SOIL BORING PROGRAM CONTROL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

QA/QC SAMPLE	SAMPLE NUMBER	(1) DATE RECEIVED	(2) SAMPLE DATE	(3,4) LABORATORY ANALYSIS
FIELD BLANK	FB-01	--	27 FEB 90	VOC, BNC, TPH, METAL
	FB-02	--	28 FEB 90	VOC, BNC, TPH, METAL, PCB
	FB-03	--	1 MAR 90	VOC, BNC, TPH, BTX
	FB-04	--	2 MAR 90	VOC + XYLENE, BNA, PAH
	FB-05	--	5 MAR 90	VOC + XYLENE, BNA, TPH
	FB-06	--	6 MAR 90	TPH, PAH
	FB-07	--	7 MAR 90	VOC + XYLENE, BNA
	FB-08	--	8 MAR 90	VOC + XYLENE, BNA
	FB-09	--	9 MAR 90	VOC + XYLENE, BNA, TPH
	FB-10	--	13 MAR 90	VOC, TPH, METAL
	FB-11	--	14 MAR 90	VOC + XYLENE, BNC, TPH, METAL
	FB-12	--	15 MAR 90	VOC + XYLENE, BNC, TPH, METAL
	FB-12A	--	16 MAR 90	VOC, TPH, METAL
	FB-14	--	19 MAR 90	VOC, BNC, TPH, METAL, BTX
	FB-15	--	21 MAR 90	TPH
	FB-16	--	22 MAR 90	VOC, BNA, BTX, PAH
	FB-17	--	23 MAR 90	VOC, BNA, TPH, BTX, METAL, CYN
	FB-18	--	26 MAR 90	VOC, BNC, TPH, PAH, PCB, METAL
	FB-21	--	3 APR 90	TPH, BTX, PAH
	FB-23	--	4 APR 90	VOC, AEC, TPH, PAH
	FB-25	--	12 APR 90	TPH, BTX, PAH

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TABLE 1 (continued)
SOIL BORING PROGRAM CONTROL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

QA/QC SAMPLE	SAMPLE NUMBER	(1) DATE RECEIVED	(2) SAMPLE DATE	(3,4) LABORATORY ANALYSIS
TRIP BLANK	TB-01	27 FEB 90	28 FEB 90	VOC
	TB-02	28 FEB 90	28 FEB 90	VOC
	TB-03	5 MAR 90	7 MAR 90	VOC
	TB-04	7 MAR 90	9 MAR 90	VOC
	TB-05	12 MAR 90	14 MAR 90	VOC
	TB-06	14 MAR 90	16 MAR 90	VOC
	TB-07	19 MAR 90	21 MAR 90	VOC
	TB-08	21 MAR 90	23 MAR 90	VOC
	TB-08A	26 MAR 90	28 MAR 90	VOC
	TB-12	3 APR 90	3 APR 90	VOC
	TB-4490	4 APR 90	5 APR 90	VOC

NOTE: (1) Date trip blank was received from Analytikem Laboratory.
(2) Date blank samples were submitted to Analytikem Laboratory for analysis.
(3) VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds only.
BNA: Base neutral/acid extractable (semivolatile organic) compounds.
TPH: Total petroleum hydrocarbons.
PAH: Polynuclear aromatic hydrocarbons.
PCB: Polychlorinated biphenyls.
BTX: Benzene, toluene, and xylene.
CYN: Cyanide.
(4) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

TABLE 2
AREA 1 (CHEMICAL STORAGE AREA) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	(1) SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (in)	(2,3) LABORATORY ANALYSIS
CS-01	CS-01S-01	27 FEB 90	6 - 12	VOC, TPH, METAL
	CS-01S-01	27 FEB 90	24 - 30	BNC
CS-02	CS-02S-01	27 FEB 90	6 - 12	VOC, TPH
	CS-02S-01	27 FEB 90	12 - 18	BNC, METAL
CS-03	CS-03S-01	27 FEB 90	48 - 54	VOC, TPH
	CS-03S-01	27 FEB 90	54 - 60	BNC, METAL
CS-04	CS-04S-01	27 FEB 90	4 - 8	TPH
	CS-04S-01	27 FEB 90	24 - 32	VOC, BNC, METAL
CS-05	CS-05S-01	7 MAR 90	18 - 24	VOC + XYLENE, BNA, TPH
	CS-05S-02	7 MAR 90	34 - 40	VOC + XYLENE, BNA, TPH
CS-06	CS-06S-01	2 MAR 90	6 - 12	VOC + XYLENE
	CS-06S-01D	2 MAR 90	6 - 12	VOC + XYLENE
	CS-06S-01A	2 MAR 90	24 - 30	BNA
	CS-06S-01AD	2 MAR 90	24 - 30	BNA
	CS-06S-02	2 MAR 90	48 - 54	VOC + XYLENE, BNA
CS-07	CS-07S-01	5 MAR 90	26 - 32	BNA, TPH
CS-08	CS-08S-01	7 MAR 90	6 - 12	BNC, TPH, METAL
CS-09	CS-09S-01	28 FEB 90	12 - 22	VOC, BNC, TPH, METAL
CS-10	CS-10S-01	27 FEB 90	6 - 12	VOC, BNC, TPH, METAL
CS-11	CS-11S-01	7 MAR 90	12 - 18	BNA, TPH, METAL
CS-12	CS-12S-01	8 MAR 90	12 - 18	VOC + XYLENE, BNA
	CS-12S-02	8 MAR 90	18 - 24	VOC + XYLENE, BNA
CS-13	CS-13S-01	7 MAR 90	24 - 30	VOC + XYLENE, BNA
CS-14	CS-14S-01	8 MAR 90	13 - 19	VOC + XYLENE, BNA
CS-15	CS-15S-01	4 APR 90	48 - 54	AEC

CONTINUED

TABLE 2 (continued)
AREA 1 (CHEMICAL STORAGE AREA) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	(1) SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (in)	(2,3) LABORATORY ANALYSIS
CS-16	CS-16S-01	4 APR 90	24 - 30	AEC
CS-17	CS-17S-01	8 MAR 90	20 - 26	VOC + XYLENE, BNA
	CS-17S-02	8 MAR 90	35 - 41	VOC + XYLENE, BNA
CS-18	CS-18S-01	4 APR 90	18 - 24	AEC

NOTE: (1) Soil sample CS-06S-01D is a field duplicate of sample CS-06S-01.
Soil sample CS-06S-01AD is a field duplicate of sample CS-06S-01A.
(2) VOC: Volatile organic compounds.
TPH: Total petroleum hydrocarbons.
BNA: Base neutrai/acid extractable (semivolatile organic) compounds.
BNC: Base neutral compounds only.
AEC: Acid extractable compounds only.
(3) Metals targeted for analysis include tiiose incorporated on the Priority Pollutant List.

TABLE 3
AREA 2 (WASTE SOLVENT STORAGE TANKS) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	(1) SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (in)	(2,3) LABORATORY ANALYSIS
WT-01	WT-01S-01	9 MAR 90	36 - 42	VOC, TPH
	WT-0IS-0ID	9 MAR 90	36 - 42	VOC, TPH
	WT-01S-01	9 MAR 90	42 - 48	BNC, METAL
	WT-0IS-0ID	9 MAR 90	42 - 48	BNC, METAL
WT-02	WT-02S-01	1 MAR 90	12 - 18	VOC, BNC, METAL, TPH
WT-03	WT-03S-01	1 MAR 90	6 - 12	VOC
	WT-03S-02	1 MAR 90	12 - 18	BNC, METAL, TPH
WT-04	WT-04S-01	1 MAR 90	72 - 78	VOC
	WT-04S-02	1 MAR 90	78 - 84	BNC, METAL, TPH

NOTE: (1) Soil sample WT-0IS-0ID is a field duplicate of WT-01S-01.
(2) VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds.
TPH: Total petroleum hydrocarbons.
(3) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

ATTACHMENT F92

TABLE 4
AREA 3 (WASTE OIL/SOLVENT STORAGE TANKS) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	(1) SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (ft)	(2,3) LABORATORY ANALYSIS
OS-01	OS-01S-01	14 MAR 90	8.5 - 9	VOC, BNA, TPH METALS, XYLENE
OS-02	OS-02S-01	26 MAR 90	10 - 10.5	VOC, BNC, TPH METALS, PCB
OS-03	OS-03S-01	28 FEB 90	3 - 3.5	VOC, BNC, TPH METALS, PCB
OS-04	OS-04S-01	26 MAR 90	4 - 4.5	VOC, BNC, TPH METALS, PCB
	OS-04S-01D	26 MAR 90	4 - 4.5	VOC, BNC, TPH METALS, PCB

NOTE: (1) Soil sample OS-04S-01D is a field duplicate of sampie OS-04S-01.
(2) VOC: Volatile organic compounds.
BNA: Base neutral/acid extractable (semivolatile organic) compounds.
BNC: Base neutral (semivolatile organic) compounds only.
TPH: Total petroleum hydrocarbons.
PCB: Polychlorinated biphenyls.
(3) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

ATTACHMENT F 93

TABLE 5
AREA 4 (JET FUEL STORAGE TANKS) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (ft)	(1) LABORATORY ANALYSIS
JF-01	JF-01S-01	22 MAR 90	2.0 - 2.5	TPH, BTX
	JF-01S-02	22 MAR 90	5.0 - 5.5	TPH, BTX, PAH
JF-02	JF-02S-01	22 MAR 90	1.75-2.25	TPH, BTX
	JF-02S-02	22 MAR 90	5.0 - 5.5	TPH, BTX, PAH
JF-03	JF-03S-01	22 MAR 90	2.5 - 3.0	VOC, BNA, TPH, BTX, PAH
JF-04	JF-04S-01	22 MAR 90	3.25-3.75	TPH, BTX
JF-05	JF-05S-01	23 MAR 90	2.0 - 2.5	TPH, BTX
JF-06	JF-06S-01	23 MAR 90	2.0 - 2.5	TFH, BTX
	JF-06S-02	23 MAR 90	5.0 - 5.5	TPH, BTX, PAH
JF-07	JF-07S-01	22 MAR 90	3.5 - 4.0	TPH, BTX
	JF-07S-02	22 MAR 90	5.5 - 6.0	TPH, BTX, PAH
JF-08	JF-08S-01	22 MAR 90	2.5 - 3.0	TPH, BTX
	JF-08S-02	22 MAR 90	5.0 - 5.5	TPH, BTX
JF-09	JF-09S-01	4 APR 90	2.5 - 3.0	TPH, PAH
	JF-09S-02	4 APR 90	4.0 - 4.5	TPH, BTX, PAH
JF-10	JF-10S-01	12 APR 90	5.0 - 5.5	TPH, BTX, PAH
JF-11	JF-11S-01	12 APR 90	1.5 - 2.0	TPH, BTX, PAH
JF-12	JF-12S-01	12 APR 90	4.0 - 4.5	TPH, BTX, PAH
	JF-12S-02	12 APR 90	6.0 - 6.5	TPH, BTX, PAH

NOTE: (1) TPH: Total petroleum hydrocarbons.
BTX: Benzene, toluene, and xylene.
PAH: Polynuclear aromatic hydrocarbons.
VOC: Volatile organic compounds.
BNA: Base neutral/acid extractable (semivolatile organic) compounds.

ATTACHMENT F-94

TABLE 6
AREA 5 (HAZARDOUS WASTE STORAGE AREA) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (in)	(1,2) LABORATORY ANALYSIS
CP-01	CP-01S-01	28 FEB 90	24 - 30	VOC, BNC, METAL
	CP-01S-02	28 FEB 90	38 - 44	VOC, BNC, METAL
CP-02	CP-02S-01	28 FEB 90	6 - 12	VOC, BNC, METAL
	CP-02S-02	28 FEB 90	48 - 54	VOC, BNC, METAL
CP-03	CP-03S-01	28 FEB 90	6 - 12	VOC
	CP-03S-01	28 FEB 90	24 - 30	BNC, METAL
	CP-03S-02	28 FEB 90	48 - 54	VOC, BNC, METAL

NOTE: (1) VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds.
TPH: Total petroleum hydrocarbons.
(2) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

TABLE 7
AREA 6 (POWERHOUSE FUEL STORAGE TANKS) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	(1,2) SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (ft)	(3) LABORATORY ANALYSIS
PH-01	PH-01S-01	21 MAR 90	5.0 - 5.5	TPH, PAH
	PH-01S-02	21 MAR 90	12.0 - 12.5	TPH
PH-02	PH-02S-01	21 MAR 90	5.0 - 5.5	TPH
	PH-02S-02	21 MAR 90	12.0 - 12.5	TPH, PAH
PH-03	--	21 MAR 90	2.5	--
PH-04	PH-04S-01	21 MAR 90	4.0 - 4.5	TPH
PH-05	PH-05S-01	21 MAR 90	4.0 - 4.5	TPH, PAH, VOC, BNC, BTX, PCB
PH-06	PH-06S-01	21 MAR 90	5.5 - 6.0	TPH, PAH
	PH-06S-02	21 MAR 90	9.0 - 9.5	TPH
PH-07	PH-07S-01	21 MAR 90	4.5 - 5.0	TPH
	PH-07S-02	21 MAR 90	8.5 - 9.0	TPH, PAH
PH-08	PH-08S-01	6 MAR 90	4.5 - 5.0	TPH
	PH-08S-02	6 MAR 90	12.0 - 12.5	TPH, PAH
PH-09	PH-09S-01	20 MAR 90	4.5 - 5.0	TPH
	PH-09S-02	20 MAR 90	12.0 - 12.5	TPH, PAH
PH-10	PH-10S-01	20 MAR 90	4.5 - 5.0	TPH
	PH-10S-02	20 MAR 90	12.0 - 12.5	TPH, PAH
	PH-10S-02D	20 MAR 90	12.0 - 12.5	TPH, PAH
PH-11	PH-11S-01	20 MAR 90	4.5 - 5.0	TPH, PAH
	PH-11S-02	20 MAR 90	12.0 - 12.5	TPH
PH-12	PH-12S-01	20 MAR 90	6.5 - 7.0	TPH
	PH-12S-02	21 MAR 90	12.0 - 12.5	TPH, PAH
PH-13	PH-13S-01	21 MAR 90	4.5 - 5.0	TPH, PAH
	PH-13S-02	21 MAR 90	10.0 - 10.5	TPH
PH-14	PH-14S-01	21 MAR 90	4.5 - 5.0	TPH, PAH
	PH-14S-02	21 MAR 90	11.0 - 11.5	TPH

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ATTACHMENT F%

TABLE 7 (continued)
AREA 6 (POWERHOUSE FUEL STORAGE TANKS) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	(1,2) SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (ft)	(3) LABORATORY ANALYSIS
PH-15	PH-15S-01	2 APR 90	4.0 - 4.5	TPH, PAH, BTX
	PH-15S-02	2 APR 90	9.0 - 9.5	TPH, PAH, BTX
PH-16	PH-16S-01	2 APR 90	4.0 - 4.5	TPH, PAH, BTX
	PH-16S-02	2 APR 90	9.5 - 10.0	TPH, PAH, BTX
PH-17	PH-17S-01	2 APR 90	8.0 - 8.5	TPH, PAH, BTX
PH-18	PH-18S-01	4 APR 90	7.0 - 7.5	TPH, PAH, BTX

NOTE: (1) No sample collected from PH-03 due to refusal at 2.5 ft below grade.
(2) Soil sample PH-10S-02D is a field duplicate of sample PH-10S-02.
(3) TPH: Total petroleum hydrocarbons.
PAH: Polynuclear aromatic hydrocarbons.
VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds.
BTX: Benzene, toluene, and xylene.
PCB: Polychlorinated biphenyls.

TABLE 8
AREA 7 (FOUNDRY STORAGE AREA) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	(1) SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (in)	(2,3) LABORATORY ANALYSIS
FS-01	FS-01S-01	9 MAR 90	9 - 15	BNC, METAL, TPH
	FS-01S-01D	9 MAR 90	9 - 15	TPH
	FS-01S-02	9 MAR 90	18 - 24	VOC, BNC, METAL, TPH
FS-02	FS-02S-01	9 MAR 90	12 - 18	BNC, METAL, TPH
	FS-02S-02	9 MAR 90	18 - 24	VOC, BNC, METAL, TPH
FS-03	FS-03S-01	9 MAR 90	6 - 12	BNC, METAL, TPH
	FS-03S-02	9 MAR 90	18 - 24	VOC, BNC, METAL, TPH

NOTE: (1) Soil sample FS-01S-01D is a field duplicate of sample FS-01S-01.
(2) VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds.
TPH: Total petroleum hydrocarbons.
(3) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

ATTACHMENT F90

TABLE 9
AREA 8 (PLANT 4 RECEIVING) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (in)	(1,2) LABORATORY ANALYSIS
PR-01	PR-01S-01	19 MAR 90	18 - 23	VOC, BNC, METAL, TPH
	PR-01S-02	19 MAR 90	42 - 48	VOC, BNC, METAL, TPH
PR-02	PR-02S-01	16 MAR 90	12 - 18	VOC, BNC, METAL, TPH
	PR-02S-02	16 MAR 90	48 - 54	VOC, BNC, METAL, TPH

NOTE: (1) VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds.
TPH: Total petroleum hydrocarbons.
(2) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

ATTACHMENT F99

TABLE 10
AREA 9 (PLANT 5 - EAST) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (in)	LABORATORY ANALYSIS (1,2)
PL-01	PL-01S-01	15 MAR 90	18 - 24	VOC, BNC, METAL, TPH
	PL-01S-02	15 MAR 90	30 - 36	VOC, BNC, METAL, TPH
PL-02	PL-02S-01	15 MAR 90	12 - 18	VOC, BNC, METAL, TPH
	PL-02S-01	15 MAR 90	36 - 46	VOC, BNC, METAL, TPH

NOTE: (1) VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds.
TPH: Total petroleum hydrocarbons.
(2) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

ATTACHMENT F100

TABLE 11
AREA 10 (FUEL OIL STORAGE TANKS) SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	(1) SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (in)	(2) LABORATORY ANALYSIS
FO-01	FO-01S-01	19 MAR 90	32 - 38	TPH, BTX
	FO-0IS-0ID	19 MAR 90	32 - 38	TPH, BTX
FO-02	FO-02S-01	16 MAR 90	28 - 34	TPH
FO-03	FO-03S-01	1 MAR 90	24 - 30	TPH, BTX, PAH
FO-04	FO-04S-01	1 MAR 90	8 - 14	TPH, BTX
FO-05	FO-05S-01	1 MAR 90	24 - 30	TPH, BTX
FO-06	FO-06S-01	26 MAR 90	36 - 42	TPH, BTX, PAH
FO-07	FO-07S-01	16 MAR 90	5 - 14	TPH, BTX, PAH
FO-08	FO-08S-01	16 MAR 90	10 - 19	TPH, BTX

NOTE: (1) Soil sample FO-0IS-0ID is a field duplicate of sample FO-01S-01.
(2) TPH: Total petroleum hydrocarbons.
PAH: Polynuclear aromatic hydrocarbons.
BTX: Benzene, toluene, and xylene.

ATTACHMENT F10)

TABLE 12
BACKGROUND BORING SOIL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

BORING LOCATION	SAMPLE NUMBER	SAMPLING DATE	SAMPLE DEPTH (in)	LABORATORY ANALYSIS (1,2)
BK-01	BK-01S-01	13 MAR 90	18 - 24	VOC, TPH
	BK-01S-01	13 MAR 90	24 - 30	BNC, METALS

NOTE: (1) VOC: Volatile organic compounds.
TPH: Total petroleum hydrocarbons.
BNC: Base neutral (semivolatile organic) compounds.
(2) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

TABLE 13
SEDIMENT SAMPLING PROGRAM CONTROL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

QA/QC SAMPLE	SAMPLE NUMBER	(1) DATE RECEIVED	(2) SAMPLE DATE	(3,4) LABORATORY ANALYSIS
FIELD BLANK	FB-17	--	23 MAR 90	VOC, BNC, TPH, PCB, METAL + CYN
TRIP BLANK	TB-08	21 MAR 90	23 MAR 90	VOC

NOTE: (1) Date trip blank was received from Analytikem Laboratory.
(2) Date blank samples were submitted to Analytikem Laboratory for analysis.
(3) VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds.
TPH: Total petroleum hydrocarbons.
PCB: Polychlorinated biphenyls.
CYN: Cyanide.
(4) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

TABLE 14
AREA 11 (WESTERN DRAINAGE DITCH) SEDIMENT SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

(1) SAMPLE NUMBER	SAMPLE DATE	SAMPLE DEPTH (in)	(2,3) LABORATORY ANALYSIS
WD-01	23 MAR 90	0 - 6	VOC, BNC, TPH, PCB, METAL + CYN
WD-01D	23 MAR 90	0 - 6	VOC, BNC, TPH, PCB, METAL + CYN
WD-02	23 MAR 90	0 - 6	VOC, BNC, TPH, PCB, METAL + CYN
WD-03	23 MAR 90	0 - 6	VOC, BNC, TPH, PCB, METAL + CYN
WD-04	23 MAR 90	0 - 6	VOC, BNC, TPH, PCB, METAL + CYN
WD-05	23 MAR 90	0 - 6	BNC, TPH

NOTE: (1) Sample WD-01D is a field duplicate of sample WD-01. Sample WD-05 corresponds to the location of the Boiler Blowdown Outfall.
(2) VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds.
TPH: Total petroleum hydrocarbons.
PCB: Polychlorinated biphenyls.
CYN: Cyanide.
(3) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

TABLE 15
AREA 12 (EOUALIZATION DITCH) SEDIMENT SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

SAMPLE NUMBER	SAMPLE DATE	SAMPLE DEPTH (in)	(1) LABORATORY ANALYSIS
EO-01	23 MAR 90	0 - 6	VOC, BNC, TPH, PCB, CYN

NOTE: (1) VOC: Volatile organic compounds.
BNC: Base neutral (semivolatile organic) compounds.
TPH: Total petroleum hydrocarbons.
PCB: Polychlorinated biphenyls.
CYN: Cyanide.

ATTACHMENT E105

TABLE 16
AREA 13 (EASTERN DRAINAGE DITCH)
SEDIMENT SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

SAMPLE NUMBER	SAMPLE DATE	SAMPLE DEPTH (in)	LABORATORY ANALYSIS (1,2)
ED-01	23 MAR 90	0 - 6	VOC, TPH, METAL
ED-02	23 MAR 90	0 - 6	VOC, TPH, METAL
ED-03	23 MAR 90	0 - 6	VOC, TPH, METAL

NOTE: (1) VOC: Volatile organic compounds.
TPH: Total petroleum hydrocarbons.
(2) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

TABLE 17
MONITORING WELL SURVEY DATA
ALLIED SIGNAL AEROSPACE FACILITY

MONITORING WELL LOCATION	(1) MONITORING WELL NO.	(2) ELEVATIONS GROUND SURFACE ELEVATION (ft)	WELL RISER ELEVATION (ft)	(3) COORDINATES NORTH (Y)	EAST (X)
AREA 1	CS-05	5.17	4.98	738622.33	2166650.28
	CS-06	5.96	5.65	738851.58	2166722.26
	CS-07	5.78	5.52	738874.22	2166673.96
	CS-i1	4.63	4.44	738744.97	2166620.26
	CS-12	5.77	5.38	738702.97	2166816.24
	CS-13	4.86	4.68	738722.31	2166697.88
	CS-14	4.46	4.20	738784.92	2166557.16
	CS-15	6.09	5.78	738807.35	2166751.47
	CS-16	5.59	5.30	738791.41	2166709.58
	CS-17	4.68	4.44	738651.45	2166789.09
	CS-18	5.78	5.53	738802.39	2166801.38
AREA 2	WT-01	5.57	5.17	738909.33	2166871.93
AREA 3	OS-01	5.19	4.99	738919.49	2166511.49
BACKGROUND	BK-01	5.47	5.22	739711.92	2167134.57

NOTE: (1) See Figure 9 for monitoring well locations.
(Location of background well BK-01 is shown on Figure 3).
(2) Elevations referenced to National Geodetic Datum (Sea Level) of 1929.
(3) Referenced to the New Jersey State Plane Coordinates System.

TABLE 18
AREA 1 - MONITORING WELL CONSTRUCTION DETAILS
ALLIED SIGNAL AEROSPACE FACILITY

	WELL INSTALLATION				WELL DEVELOPMENT		
WELL NO.	DATE	(1) BORING DEPTH (ft)	SCREEN LENGTH (ft)	(1) SCREEN BASE DEPTH (ft)	DATE	WELL VOLUME REMOVED	(2,3) CORRESPONDING SOIL BORING NO.
CS-05	7 MAR	5.0	3.0	5.0	8 - 9 MAR	5	CS-05
CS-06	2 MAR	6.0	3.0	5.0	13 - 15 MAR	7	CS-06
CS-07	5 MAR	8.0	4.0	6.0	13 - 15 MAR	6	CS-07
CS-11	7 MAR	6.5	4.0	6.0	14 - 15 MAR	5	CS-11
CS-12	8 MAR	6.0	3.0	5.0	15 - 16 MAR	5	CS-12
CS-13	7 MAR	6.0	3.0	4.5	9 - 15 MAR	4	CS-13
CS-14	8 MAR	5.0	3.5	5.0	14 - 15 MAR	5	CS-14
CS-15	12 MAR	7.5	5.0	7.0	13 - 14 MAR	6	CS-15
CS-16	8 MAR	7.5	4.5	7.0	13 - 15 MAR	5	CS-16
CS-17	4 APR	6.6	3.0	5.0	13 - 16 MAR	5	CS-17
CS-18	8 MAR	6.5	4.5	6.5	13 - 15 MAR	5	CS-18

NOTE: (1) Depth in feet below ground surface.
(2) See Figure 4 for location of soil borings converted to monitoring wells.
(3) See Figure 9 for monitoring well locations only.

ATTACHMENT F108

TABLE 19
AREA 2 - MONITORING WELL CONSTRUCTION DETAILS
ALLIED SIGNAL AEROSPACE FACILITY

	WELL INSTALLATION				WELL DEVELOPMENT		
WELL NO.	DATE	(1) BORING DEPTH (ft)	SCREEN LENGTH (ft)	(1) SCREEN BASE DEPTH (ft)	DATE	WELL VOLUME REMOVED	(2,3) CORRESPONDING SOIL BORING NO.
WT-01	13 MAR	6.0	3.5	5.5	13 - 14 MAR	5	WT-01

NOTE: (1) Depth in feet below ground surface.
(2) See Figure 4 for location of soil borings converted to monitoring wells.
(3) See Figure 9 for monitoring well locations only.

ATTACHMENT E109

TABLE 20
AREA 3 - MONITORING WELL CONSTRUCTION DETAILS
ALLIED SIGNAL AEROSPACE FACILITY

WELL NO.	WELL INSTALLATION DATE	(1) BORING DEPTH (ft)	SCREEN LENGTH (ft)	(1) SCREEN BASE DEPTH (ft)	WELL DEVELOPMENT DATE	WELL VOLUME REMOVED	(2,3,4) CORRESPONDING SOIL BORING NO.
OS-01	14 MAR	8.0	5.0	7.0	15 MAR	3	OS-01/CP-03

NOTE: (1) Depth in feet below ground surface.
(2) Soil boring CP-03 was re-advanced and converted to boring OS-01.
(3) See Figure 4 for location of soil borings converted to monitoring wells.
(4) See Figure 9 for monitoring well locations only.

ATTACHMENT F110

TABLE 21
BACKGROUND WELL CONSTRUCTION DETAILS
ALLIED SIGNAL AEROSPACE FACILITY

	WELL INSTALLATION				WELL DEVELOPMENT		
WELL NO.	DATE	(1) BORING DEPTH (ft)	SCREEN LENGTH (ft)	(1) SCREEN BASE DEPTH (ft)	DATE	WELL VOLUME REMOVED	(2) CORRESPONDING SOIL BORING NO.
BK-01	13 MAR	6.0	3.5	5.5	15 MAR	3	BK-01

NOTE: (1) Depth in feet below ground surface.
(2) See Figure 3 for location of soil boring converted to monitoring weii.

ATTACHMENT F

TABLE 22
GROUNDWATER SAMPLING CONTROL SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

QA/QC SAMPLE	SAMPLE NUMBER	(1) DATE RECEIVED	(2) SAMPLE DATE	(3,4) LABORATORY ANALYSIS
FIELD BLANK	FB-19	--	29 MAR 90	VOC + XYLENE, BNA, TDS, pH
	FB-20	--	30 MAR 90	VOC + XYLENE, BNA, TDS, pH, TPH, METAL
	FB-22	--	3 APR 90	VOC + XYLENE, BNA, TDS, pH, TPH, METAL
	FB-24	--	4 APR 90	VOC + XYLENE, BNA, TDS, pH, TPH, METAL
DEIONIZED WATER BLANK	WT-02A-01	29 MAR 90	30 MAR 90	VOC + XYLENE, BNA, TDS, pH, TPH
TRIP BLANK	TB-10	29 MAR 90	29 MAR 90	VOC
	TB-11	30 MAR 90	30 MAR 90	VOC
	TB-13	3 APR 90	3 APR 90	VOC
	TB-4490	4 APR 90	5 APR 90	VOC

NOTE: (1) Date trip blank was received from Analytikem Laboratory.
(2) Date blank samples were submitted to Analytikem Laboratory for analysis.
(3) VOC: Volatile organic compounds.
BNA: Base neutral/acid extractable (semivolatile organic) compounds.
TDS: Total dissolved solids.
TPH: Total petroleum hydrocarbons.
(4) Metals targeted for analysis include those incorporated on the Priority Pollutant List.

ATTACHMENT F112

TABLE 23
GROUNDWATER SAMPLE SUMMARY
ALLIED SIGNAL AEROSPACE FACILITY

MONITORING WELL LOCATION	MONITORING WELL NO.	(1) SAMPLE NUMBER	SAMPLE DATE	(2,3) LABORATORY ANALYSIS
AREA 1	CS-05	CS-05A-01	30 MAR 90	VOC + XYLENE, BNA, TDS, pH
	CS-06	CS-06A-01	30 MAR 90	VOC + XYLENE, BNA, TDS, pH
	CS-07	CS-07A-01	30 MAR 90	VOC + XYLENE, BNA, TDS, pH
	CS-11	CS-11A-01	29 MAR 90	VOC + XYLENE, BNA, TDS, pH
	CS-12	CS-12A-01	4 APR 90	VOC + XYLENE, BNA, TPH, TDS, pH
	CS-13	CS-13A-01	29 MAR 90	VOC + XYLENE, BNA, TDS, pH
	CS-14	CS-14A-01	3 APR 90	VOC + XYLENE
	CS-15	CS-15A-01	29 MAR 90	VOC + XYLENE, BNA, TDS, pH
		CS-15A-01D	29 MAR 90	VOC + XYLENE, BNA, TDS, pH
	CS-16	CS-16A-01	29 MAR 90	VOC + XYLENE, BNA, TDS, pH
	CS-17	CS-17A-01	4 APR 90	VOC + XYLENE, BNA, TPH, TDS, pH
	CS-18	CS-18A-01	29 MAR 90	VOC + XYLENE, BNA, TDS, pH
AREA 2	WT-01	WT-01A-01	30 MAR 90	VOC, BNC, TPH, METALS
		WT-01A-0ID	30 MAR 90	TPH, METALS
AREA 3	OS-01	OS-01A-01	4 APR 90	VOC, BNA, TPH, METAL
BACKGROUND	BK-01	BK-01A-01	3 APR 90	VOC, BNA, TPH, METAL

NOTE: (1) Groundwater sample CS-15A-01D is a field duplicate of sample CS-15A-01.
Groundwater sample WT-0IA-0ID is a field duplicate of sample WT-01A-01.
(2) VOC: Volatile organic compounds.
BNA: Base neutral/acid extractable (semivolatile organic) compounds.
BNC: Base neutral (semivolatile organic) compounds.
TDS: Total dissolved solids.
TPH: Total petroleum hydrocarbons.
(3) Metals targeted for analysis include those incorporated on the Priority Pollutant List (PPL).

TABLE 24
GROUNDWATER SURFACE ELEVATIONS
ALLIED SIGNAL AEROSPACE FACILITY

(1) WELL LOCATION	WELL NUMBER	(2,3) GROUNDWATER SURFACE ELEVATIONS 29 MAR	30 MAR	4 APR	12 APR	17 APR	8 MAY
AREA 1	CS-05	--	--	--	1.88	2.92	2.98
	CS-06	3.04	--	--	3.67	3.58	3.46
	CS-07	2.27	--	--	2.7	2.56	1.89
	CS-11	2.2	--	--	2.96	3.07	--
	CS-12	--	--	2.5	2.64	2.65	2.71
	CS-13	2.95	--	--	2.96	3.38	3.93
	CS-14	--	--	--	0.76	1.23	2.49
	CS-15	2.96	--	--	2.76	2.84	2.68
	CS-16	3.67	--	--	4.06	3.7	3.88
	CS-17	--	--	2.6	2.06	2.11	1.86
	CS-18	2.13	--	--	2.29	2.38	2.17
AREA 2	WT-01	--	3.19	--	3.16	3.51	2.52
AREA 3	OS-01	--	--	2.77	0.92	1.07	--
BACKGROUNO	BK-01	--	2.11	--	2.27	2.76	--

NOTE: (1) AREA 1: Chemical Storage Area.
AREA 2: Waste Solvent Tanks.
AREA 3: Waste Oil/Solvent Tanks.
BACKGROUNO: Background boring.
(2) Groundwater elevations measured in feet relative to National Geodetic Datum of 1929.
(3) --: No measurement taken.

ATTACHMENT F114

TABLE 25

AREA 1 - CHEMICAL STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS
VOCs, BN, AND PETROLEUM HYDROCARBON COMPOUNDS (1)

	CS-01S-01	CS-02S-01	CS-03S-01	CS-04S-01	CS-05S-01(2)	CS-05S-02(2)	CS-06S-01(2)	CS-06S-01D(2)	CS-06S-02(2)	NJDEP Soil Action Level
Volatile Organics										
Methylene Chloride	ND	ND	ND	ND	ND	ND	1.2	0.34 J	ND	
1,1,1-Trichloroethane	ND	ND	0.48	3.4	ND	ND	ND	ND	0.98	
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	0.083 J	0.54	
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	1.8	
Ethylbenzene	ND	ND	5.8	ND	ND	ND	ND	ND	ND	
m-Xylene	ND	ND	29.	ND	ND	ND	ND	ND	ND	
o,p-Xylene	ND	ND	26.	ND	ND	ND	ND	ND	ND	
Toluene	ND	ND	8.2	ND	ND	ND	ND	ND	ND	
VOC TICs										
1,1,2-Trichloro-1,2,2, trifluorothene	ND	ND	ND	0.33	0.76	ND	0.25	ND	0.33	
Unknown Compounds	ND	ND	6.86	2.74	3.76	ND	ND	ND	ND	
Total VOCs	ND	ND	69.48	3.4	ND	ND	1.2	0.42	3.32	
Total TICs	ND	ND	6.86	3.07	4.52	ND	0.25	ND	0.33	
Total VOCs & TICs	ND	ND	76.34	6.47	4.52	ND	1.45	0.42	3.65	*
Base Neutrals										
Fluorene	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Naphthalate	ND	ND	1.5	ND	ND	ND	ND	ND	ND	
N-Nitrosodiphenylamine	ND	ND	ND	ND	0.34 J	0.26 J	ND	ND	ND	
Penthchiorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Phenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Fluoranthene	0.2 J	ND	ND	ND	ND	ND	ND	ND	ND	
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Bis(2-ethylhexyl)Phthalate	ND	ND	ND	0.45	0.099 J	0.072 J	0.34 J	0.26 J	0.12 J	
Chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Pyrene	0.19 J	ND	ND	ND	ND	ND	ND	ND	ND	
BN TICs										
Unknown Compounds	1.9	1.9	219	1.5	8.77	1.95	2.05	2.82	4.28	
Total BNs	0.39	ND	1.5	0.45	0.43	0.33	0.34	0.26	0.12	
Total TIC's	1.9	1.9	219	1.5	8.77	1.95	2.05	2.82	4.28	
Total BNs & TICs	2.29	1.9	220.5	1.95	9.2	2.28	2.39	3.08	4.4	+
Petroleum Hydrocarbons	870	740	3,900	270	ND	ND	NA	NA	NA	X

ATTACHMENT F115

TABLE 25 (Cont'd)

AREA 1 - CHEMICAL STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS
VOCs, BN, AND PETROLEUM HYDROCARBON COMPOUNDS (1)

	CS-07S-01 (2)	CS-08S-01	CS-09S-01	CS-10S-01	CS-11S-01 (2)	CS-12S-01 (2)	CS-12S-02 (2)	Soil Action Level
Volatile Organics								
Methylene Chloride	NA	NA	0.34	ND	NA	0.92	ND	
1,1,1-Trichloroethane	NA	NA	ND	ND	NA	ND	ND	
Trichloroethene	NA	NA	ND	ND	NA	ND	ND	
Tetrachloroethene	NA	NA	ND	1.9	NA	ND	ND	
Ethylbenzene	NA	NA	ND	1.9	NA	ND	ND	
m-Xylene	NA	NA	ND	5.1	NA	ND	ND	
o,p-Xylene	NA	NA	ND	5.4	NA	ND	ND	
VOC TICs								
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	NA	ND	6.9		ND	0.65	
Unknown Compounds	NA	NA	8.04	21.33	NA	ND	ND	
Total VOCs	NA	NA	0.34	16.59	NA	0.92	ND	
Total TICs	NA	NA	8.04	28.23	NA	ND	0.65	
Total VOCs & TICs	NA	NA	8.38	44.82	NA	0.92	0.65	*
Base Neutrals								
Fluorene	ND	ND	ND	ND	0.052 J	ND	ND	
Naphthalate	ND	ND	ND	ND	ND	ND	ND	
N-Nitrosodiphenylamine	ND	0.22 J	ND	ND	0.22 J	0.22 J	ND	
Penthchlorophenol	ND	ND	ND	ND	ND	ND	0.35	
Phenanthrene	ND	ND	ND	2.2	ND	0.57	ND	
Anthracene	ND	ND	ND	0.67	ND	0.14 J	ND	
Fluoranthene	ND	ND	ND	3.1	ND	0.73	0.28 J	
Benzo(a)anthracene	ND	ND	ND	1.6	ND	0.48	ND	
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	0.67	ND	
Bis(2-ethylhexyl)Phthalate	0.055 J	0.2 J	ND	ND	0.10 J	ND	0.45 J	
Chrysene	ND	ND	ND	2.2	ND	0.81	0.57 J	
Pyrene	ND	ND	ND	2.5	0.048 J	1.0	0.57 J	
BN TICs								
Unknown Compounds	6.4	8.25	684	16.1	8.57	4.8	29.4	
Total BNs	0.55	0.42	ND	12.27	0.42	4.62	2.22	
Total TICs	6.4	8.25	684	16.1	8.57	4.8	29.4	
Total BNs & TICs	6.95	8.67	684	28.37	8.99	9.42	31.64	+
Petroleum Hydrocarbons	ND	3,400	510	4,400	130	NA	NA	X

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ATTACHMENT E 116

TABLE 25 (Cont'd)

AREA 1 - CHEMICAL STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS
VOCs, BN, AND PETROLEUM HYDROCARBON COMPOUNDS (1)

	CS-13S-01 (2)	CS-14S-01 (2)	CS-17S-01 (2)	CS-17S-02 (2)	Soil Action Level
Volatile Organics					
Methylene Chloride	ND	0.62	I.1	ND	
1,1,1-Trichloroethane	MD	ND	ND	ND	
Trichloroethene	ND	ND	ND	ND	
Tetrachloroethene	0.3 J	ND	ND	ND	
Ethylbenzene	ND	ND	ND	ND	
n-Xylene	ND	ND	ND	ND	
o,p-Xylene	ND	ND	ND	ND	
VOC TICs					
1,1,2-Trichloro-1,2,2-trifluoroethane	0.2	ND	ND	0.32	*
Unknown Compounds	ND	ND	ND	ND	
Total VOCs	0.3	0.62	1.1	ND	
Total TICs	0.2	ND	ND	0.32	
Total VOCs & TICs	0.5	0.62	1.1	0.32	*
Base Neutrals					
Fluorene	ND	ND	ND	ND	
Naphthalate	ND	ND	ND	ND	
N-Mitrosodiphenylanine	ND	ND	ND	ND	
Penthchlorophenol	ND	ND	ND	ND	
Phenanthrene	ND	0.23 J	ND	ND	
Anthracene	ND	0.037 J	ND	ND	
Fluoranthene	ND	0.28 J	ND	ND	
Benzo(a)anthracene	ND	ND	ND	ND	
Benzo(k)fluoranthene	ND	ND	ND	ND	
Bis(2-ethylhexyl)Phthalat	ND	0.076 J	ND	0.087	
Chrysene	ND	0.22J	ND	ND	
Pyrene	ND	0.26 J	ND	ND	
BN TICs					
Unknown Compounds	2.56	7.56	10.34	2.7	
Total BNs	ND	1.10	ND	0.087	
Total TICs	2.56	7.56	10.34	2.7	
Total BNs & TICs	2.56	8.66	10.34	2.78	+
Petroleum Hydrocarbons	NA	NA	NA	NA	X

2769K

ATTACHMENT F117

TABLE 25 (Cont'd)

AREA 1 - CHEMICAL STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS
VOCs, BN, ANO PETROLEUM HYDROCARBON COMPOUNDS (1)

<u>Note</u>:
- (1) Compound concentrations are reported in mg/kg (ppm)
- (2) BN analysis results include Acid Extractables
- J Laboratory estimated value
- * Volatile Organics NJOEP Soil Action Level is 1 ppm total in soil
- + Base Neutrals NJOEP Soil Action level is 10 ppm total in soil
- X Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene or PAH's
- ND Not detected
- NA Not analyzed for

2769K

ATTACHMENT F-18

TABLE 26

AREA 1 - CHEMICAL STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS
ACID EXTRACTABLES (1)

	CS-15S-01	CS-16S-01	CS-18S-01
Acid Extractables	ND	ND	ND
AE TICs			
Unknown Compound	55.25	2.8	19.38
Unknown Hydrocarbon	60.93	ND	ND
Dimethylbenzene Isomer	11.5	ND	ND
Trimethylbenzene Isomer	5.3	ND	ND
Total AEs	ND	ND	ND
Total TICs	132.98	2.8	19.38
Total AEs & TICs	132.98	2.8	19.38

Note: (1) Compound concentrations are reported in mg/kg (ppm)
ND Not detected

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ATTACHMENT E119

TABLE 27

AREA 1 - CHEMICAL STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS
METALS ANALYSIS (1)

Metals	CS-01S-01	CS-02S-01	CS-03S-01	CS-04S-01	CS-08S-01	CS-09S-01	CS-10S-01	CS-11S-01	NJDEP Soil Action Level
Metals									
Antimony	1.4 J	1.4 J	ND	ND	0.7	0.94	ND	ND	10
Arsenic	11	1.7	1.3	1.2	0.8	3.3	3.1	0.75	20
Cadmium	8.9	ND	ND	ND	ND	37	9.4	ND	3
Chromium	77	35	11	32	21	32	30	13	100
Copper	3.3 J	65	6.3	22	75	120	180	12	170
Lead	93	28	ND	ND	35	60	54	ND	250-1000
Mercury	ND	ND	ND	ND	38	1.1	ND	ND	1
Nickel	32	13	ND	8.3	22	24	19	ND	100
Selenium	0.79 J	ND	ND	ND	ND	ND	ND	0.340	4
Zinc	230	140	18	29	130	170	99	12	350

Note: (1) Compound concentrations are reported in mg/kg (ppm)
J Laboratory estimated value
ND Not detected

ATTACHMENT E120

TABLE 28

AREA 2 - WASTE SOLVENT TANK AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS (1)

	WT-01S-01	WT-01S-01D	WT-02S-01	WT-03S-01	WT-03S-02	WT-04S-01	WT-04S-02	NJDEP Soil Action Level
Volatile Organics								
Methylene Chloride	ND	ND	ND	0.42	NA	ND	NA	
trans-1,2-Dichloroethene	ND	0.42	ND	ND	NA	ND	NA	
1,1,1-trichloroethane	ND	ND	ND	ND	NA	2.5	NA	
Trichloroethene	ND	ND	ND	12.0	NA	61.0	NA	
Tetrachloroethene	ND	ND	ND	0.48	NA	19.0	NA	
VOC-TICs								
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	ND	ND	6.1	NA	4.5	NA	
Unknown Compound	ND	ND	ND	0.7	NA	ND	NA	
Total VOCs	ND	0.42	ND	12.9	NA	82.5	NA	
Total TICs	ND	ND	ND	6.8	NA	ND	NA	
Total VOCs & TICs	ND	0.42	ND	19.0	NA	87.0	NA	*
Base Neutrals								
Fluorene	0.3 J	0.21 J	ND	NA	ND	NA	ND	
Phenanthrene	ND	ND	0.019 J	NA	ND	NA	ND	
Bis(2-ethylhexyl)Phthalate	0.13 J	0.12 J	0.13 J	NA	ND	NA	ND	
Base Neutral TICs								
Unknown Compound	7.25	3.56	6.31	NA	58.3	NA	2.2	
Tetrachloroethene	ND	ND	ND	NA	ND	NA	2.0	
Total BNs	0.43	0.33	0.14	NA	ND	NA	ND	
Total TICs	7.25	3.56	6.31	NA	58.3	NA	4.2	
Total Base Neutrals & TICs	7.68	3.89	6.45	NA	58.3	NA	4.2	+

ATTACHMENT F121

2769K

TABLE 28 (Cont'd)

AREA 2 - WASTE SDLVENT TANK AREA (SDIL)
SUMMARY DF ANALYTICAL RESULTS (1)

	WT-01S-01	WT-01S-01D	WT-02S-0I	WT-03S-01	WT-03S-02	WT-04S-01	WT-04S-02	NJDEP Soil Action Level
Metals								
Arsenic	0.86 J	0.89 J	0.62 J	NA	1.5	NA	1.4	20
Chromium	10	8.7	ND	NA	32	NA	26	100
Copper	8.2	8.5	5.9	NA	40	NA	19	170
Lead	ND	ND	ND	NA	ND	NA	28	250-1000
Hercury	ND	ND	0.083	NA	0.086 J	NA	0.13 J	1
Nickel	8.3	7.7	ND	NA	ND	NA	ND	100
Zinc	21	19	20	NA	43	NA	33	350
Petroleum Hydrocarbons	ND	HD	130	NA	22	NA	4900	X

Note: (1) Coapound concentrations are reported in mg/kg (ppm)
J Laboratory estimated value
* Volatile Drganics NJDEP Soil Action Level is 1 ppm total in soil
+ Base Neutrals NJDEP Soil Action Level is 10 ppm total in soil
X Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene or PAH's
ND Not detected
ND Not analyzed for.

ATTACHMENT F 122

2769K

TABLE 29

AREA 3 - WASTE OIL/SOLVENT TANKS (SOIL)
SUMMARY OF ANALYTICAL RESULTS (1)

	OS-01S-01	OS-02S-01	OS-03S-01	OS-04S-01	OS-04S-01D	NJDEP Soil Action Level
Volatile Organics						
Methylene Chloride	0.48	ND	0.49	0.81	ND	
1,1-Dichloroethene	ND	1.2	ND	ND	ND	
trans-1,2-Dichloroethene	ND	ND	ND	0.70	0.63 J	
1,1,1-Trichloroethane	ND	0.77	ND	0.53	1.6	
Benzene	ND	0.23 J	ND	ND	ND	
Tetrachloroethene	ND	0.063 J	1.2	0.95	4.7	
Toluene	ND	13	0.69	5.4	19.	
Ethylbenzene	ND	3.3	0.13 J	3.8	17.	
m-Xylene	ND	7.8	NA	8.6	37.	
o,p-Xylene	ND	5.3	NA	6.1	25.	
VOC TICs						
1,1,2-Trichloro-1,2,2-Trifluoroethene	ND	1.3	ND	0.54	4.	
Unknown Hydrocarbon	ND	ND	ND	2.42	ND	
Unknown Compound	ND	2.7	ND	7.9	96.7	
Substituted Cyclohexane	ND	ND	ND	0.64	ND	
Ethylmethyl Cyclohexane Isomer	ND	ND	ND	ND	1.9	
Total VOCs	0.48	31.66	2.51	26.89	104.93	
Total TICs	ND	4	ND	11.5	102.6	
Total VOCs & TICs	0.48	35.66	2.51	38.37	207.53	*
Base Neutrals						
Naphthalene	ND	ND	0.043 J	0.91	3.1	
Fluoranthene	ND	ND	0.048 J	ND	ND	
Phenanthrene	ND	ND	ND	ND	1.0	
Pyrene	ND	ND	0.039 J	ND	ND	
Bis(2-ethylhexyl) Phthalate	ND	ND	ND	ND	0.25	
Benzo(a)anthracene	ND	ND	0.031 J	ND	ND	
BN TICs						
Unknown Compound	14.8	1.1	8.7	6.9	34.3	
Trimethylbenzene Isomer	ND	ND	ND	ND	4.9	
Substituted Aromatic	ND	ND	ND	ND	22.8	
Ethyldimethylbenzene Isomer	ND	ND	ND	ND	9.2	
Tetramethylbenzene Isomer	ND	ND	ND	ND	4.3	
Total BNs	ND	ND	0.16	0.91	4.35	
Total TICs	14.8	1.1	8.7	6.9	75.5	
Total BNs & TICs	14.8	1.1	8.9	7.8	79.9	+

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TABLE 29 (Cont'd)

AREA 3 - WASTE DIL/SDLVENT TANKS (SDIL)
SUMMARY DF ANALYTICAL RESULTS (1)

	OS-01S-01	OS-02S-01	OS-03S-01	OS-04S-01	OS-04S-010	NJDEP Soil Action Level
Metals						
Arsenic, total	0.82 J	2	1.3	2.1	1.4	20
Cadmium	ND	ND	ND	ND	ND	3
Chromium, total	9.4	11	15	11	11	100
Copper, total	10	11	21	9.4	8.4	170
Lead	ND	ND	ND	6.1	ND	250-1000
Mercury	ND	ND	0.068 J	ND	ND	1
Nickel, total	6.3	15	7.8	8.8	11	100
Zinc, total	19	29	27	23	22	350
Polychlorinated Biphenyls						
Aroclor 1016	NA	ND	ND	ND	ND	
Aroclor 1221	NA	ND	ND	ND	ND	
Aroclor 1232	NA	ND	ND	ND	ND	
Aroclor 1242	NA	ND	ND	ND	ND	
Aroclor 1248	NA	ND	ND	ND	ND	
Aroclor 1254	NA	ND	ND	2	ND	
Aroclor 1260	NA	ND	ND	ND	ND	
Petroleum Hydrocarbons	120	46	24	580	1300	X

Note: (1) Compound concentrations are reported in mg/kg (ppm)
J Laboratory estimated value
* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil
+ Base Neutrals NJDEP Soil Action Level is 10 ppm total in soil
X Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene or PAH's
ND Not detected
ND Not analyzed for

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2769K

TABLE 30

AREA 4 - JET FUEL STORAGE TANKS (SOIL)
SUMMARY OF ANALYTICAL RESULTS(1)

	JF-01S-01	JF-01S-02	JF-02S-01	JF-02S-02	JF-03S-01	JF-03S-01(2)	JF-04S-01	JF-05S-01	JF-06S-01	JF-06S-02	NJDEP Soil Action Level
BTEX											
Methylene Chloride	NA	NA	NA	NA	NA	3.6 J	NA	NA	NA	NA	
Benzene	ND	ND	ND	ND	0.087		ND	ND	0.005 J	ND	
Toluene	ND	ND	ND	ND	0.17		0.02 J	ND	ND	ND	
Ethylbenzene	ND	ND	ND	ND	0.12	6.3	0.006 J	ND	0.01 J	ND	
m-xylene	ND	ND	ND	ND	0.47	16.0	ND	ND	0.012 J	ND	
p-xylene	ND	ND	ND	ND	0.10 J	9.9 (3)	0.02 J	ND	ND	ND	
o-xylene	ND	ND	ND	0.42	0.13 J		ND	ND	0.06 J	ND	
VOC TICS	NA	NA	NA	NA	236.6		NA	NA	NA	NA	
Total BTEX and TICs	ND	ND	ND	0.42	237.7		0.05	ND	0.09	ND	*
Petroleum Hydrocarbons	1700	ND	220	ND	1300		110	420	24	ND	X
Polynuclear Aromatic Hydrocarbons											
Naphthalene	NA	ND	NA	ND	4.0		NA	NA	NA	ND	
Acenaphthylene	NA	ND	NA	ND	0.14 J		NA	NA	NA	ND	
Anthracene	NA	ND	NA	ND	0.14 J		NA	NA	NA	ND	
Phenanthrene	NA	ND	NA	ND	64		NA	NA	NA	ND	
Fluoranthene	NA	ND	NA	ND	0.46		NA	NA	NA	ND	
Pyrene	NA	ND	NA	ND	0.47		NA	NA	NA	ND	
Bis(2-ethylhexyl)Phthalate	NA	ND	NA	ND	1.9		NA	NA	NA	ND	
BNA TICs											
Unknown Compound	NA	0.23	NA	4.9	128.7		NA	NA	NA	3.48	
Trimethybenzene Isomer	NA	ND	NA	ND	3.6		NA	NA	NA	ND	
Ethyldimethylbenzene Isomer	NA	ND	NA	ND	19.1		NA	NA	NA	ND	
Unknown Hydrocarbon	NA	ND	NA	ND	35.1		NA	NA	NA	ND	
Dimethybenzene Isomer	NA	ND	NA	ND	2		NA	NA	NA	ND	
Total PAHs	NA	ND	NA	ND	7.75		NA	NA	NA	ND	
Total TICs	NA	0.23	NA	4.9	188.7		NA	NA	NA	3.48	
Total BN(A)s & TICs	NA	0.23	NA	4.9	196.45		NA	NA	NA	3.48	+

ATTACHMENT E
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2769K

TABLE 30 (Cont'd)

AREA 4 - JET FUEL STORAGE TANKS (SOIL)
SUMMARY OF ANALYTICAL RESULTS(1)

	JF-07S-01	JF-07S-02	JF-08S-01	JF-08S-02	JF-09S-01	JF-09S-02	JF-10S-01	JF-11S-01	JF-12S-01	JF-12S-02	NJDEP Soil Action Level
BTEX											
Benzene	ND	ND	ND	0.019 J	NA	ND	ND	ND	ND	ND	
Toluene	0.034 J	ND	0.34 J	0.45	NA	ND	ND	ND	ND	ND	
Ethylbenzene	0.03 J	ND	0.11 J	0.18 J	NA	ND	ND	ND	ND	ND	
m-xylene	0.026 J	ND	0.061 J	0.79	NA	ND	ND	ND	ND	ND	
p-xylene	ND	ND	0.19 J	0.21	NA	ND	ND	ND	ND	ND	
o-xylene	ND	0.02 J	ND	ND	NA	ND	ND	ND	ND	ND	
VOC TICs	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total BTEX and TICs	0.09	0.02	0.70	1.65	NA	ND	ND	ND	ND	ND	*
Petroleum Hydrocarbons	1300	150	140	1200	81	ND	ND	1900	840	ND	X
Polynuclear Aromatic Hydrocarbons											
Acenaphthene	NA	ND	NA	NA	ND	ND	ND	0.06 J	ND	ND	
Fluorene	NA	ND	NA	NA	ND	ND	ND	0.056 J	ND	ND	
Phenanthrene	NA	ND	NA	NA	0.21	ND	ND	0.45	0.083 J	ND	
Anthracene	NA	ND	NA	NA	ND	ND	ND	0.14 J	0.022 J	ND	
Fluoranthene	NA	ND	NA	NA	ND	0.076	ND	1.1	0.14 J	ND	
Pyrene	Na	ND	NA	NA	ND	0.083	ND	0.78	0.12 J	ND	
Benzo(a)anthracene	NA	ND	NA	NA	ND	ND	ND	0.56	0.086 J	ND	
Chrysene	NA	ND	NA	NA	ND	ND	ND	0.83	0.12 J	ND	
Benzo(b)fluoranthene	NA	ND	NA	NA	ND	ND	ND	0.59	0.087 J	ND	
Benzo(k)fluoranthene	NA	ND	NA	NA	ND	ND	ND	0.45	0.094 J	ND	
Benzo(a)pyrene	NA	ND	NA	NA	ND	ND	ND	0.52	0.093 J	ND	
Indeno(1,2,3-cd)pyrene	NA	ND	NA	NA	ND	ND	ND	0.30 J	ND	ND	
Dibenzo(a,h)anthracene	NA	ND	NA	NA	ND	ND	ND	0.078 J	ND	ND	
Benzo(g,h,i)perylene	NA	ND	NA	NA	ND	ND	ND	0.32 J	ND	ND	
BN TICs											
Unknown Compound	NA	2.75	NA	NA	4.85	21.86	5.64	49.47	20.47	2.85	
Bis(2-ethylhexyl)Phthalate	NA	ND	NA	NA	ND	ND	ND	ND	0.610	0.79	
Total PAHs	NA	ND	NA	NA	0.21	0.159	ND	6.2	0.84	ND	
Total BN TICs	NA	2.75	NA	NA	4.85	21.86	5.64	49.47	21.07	3.64	
Total PAHs & TICs	NA	2.75	NA	NA	5.1	22.	5.64	50.8	21.92	3.64	+

NOTE: (1) Compound concentrations are reported in mg/kg (ppm)
(2) Volatile Organics analysis performed on JF-03S-01
(3) This concentration is the sum of the concentrations of p-xylene and o-xylene.
J Laboratory estimated value
* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil
\+ Base Neutrals NJDEP Soil Action Level is 10 ppm total in soil
x Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene or PAH's
ND Not detected
NA Not analyzed for

2769K

ATTACHMENT F26

TABLE 31
AREA 5 - HAZARDOUS WASTE STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS (1)

Volatile Organics (ppm)	CP-01S-01	CP-01S-02	CP-02S-01	CP-02S-02	CP-03S-01	CP-03S-02	NJDEP Soil Action Level
Methylene chloride	1.1	1.2	0.46	ND	ND	0.62	
Trichloroethene	ND	ND	0.55	ND	ND	ND	
Tetrachloroethene	ND	ND	0.44	ND	ND	3.6	
Toluene	ND	ND	ND	ND	0.2 J	ND	
VOC TICs							
Unknown Compound	ND	ND	ND	ND	ND	ND	
1,1,2 Trichloro-1,2,2-fluoroethane	0.22	ND	0.19	ND	ND	ND	
Total VOCs	1.1	1.2	1.45	ND	0.2	4.22	
Total TICs	0.22	ND	0.19	ND	ND	ND	
Total Volatiles & TICs	1.32	1.2	1.64	ND	0.2	4.22	*
Base Neutrals (ppm)							
Naphthalene	ND	0.077 J	ND	ND	ND	ND	
Pyrene	0.037 J	ND	ND	ND	ND	ND	
Butylhenzyl Phthalate	ND	0.021 J	ND	ND	ND	ND	
Benzo(a)anthracene	0.022 J	ND	ND	ND	ND	ND	
Bis(2-ethylhexyl)phthalate	0.028 J	0.037 J	ND	0.024 J	ND	ND	
Chrysene	0.061 J	ND	ND	ND	ND	ND	
Base Neutrals (TICs)							
BN Unknown compound	1.37	7.6	20	1.88	4.15	4.01	
BN Unknown hydrocarbon	ND	ND	ND	ND	0.19	ND	
BN Dimethylbenzene isomer	ND	ND	ND	ND	0.51	ND	
BN Trimethylbenzene isomer	ND	ND	ND	ND	0.4	ND	
BN Diethylbenzene isomer	ND	ND	ND	ND	0.2	ND	
Total BNs	0.148	0.135	ND	0.024	ND	ND	
Total TICs	1.37	7.6	20	1.88	5.45	4.01	
Total BNs & TICs	1.51	7.74	20	1.90	5.45	4.01	+

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2769K

TABLE 31 (Cont'd)
AREA 5 - NAZARDOUS WASTE STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS (1)

Metals	CP-01S-01	CP-01S-02	CP-02S-01	CP-02S-02	CP-03S-01	CP-03S-02	NJDEP Soil Action Level
Antimony, total	ND	ND	83	ND	ND	ND	10
Arsenic, total	1,9	1,2	70	ND	ND	ND	20
Beryllium, total	ND	ND	6	ND	ND	ND	1
Cadmium	41	ND	ND	ND	ND	ND	3
Chromium	32	ND	79	ND	16	6.7	100
Copper, total	160	21	1,400	2.9 J	18	3 J	170
Lead, total	28	ND	1,000	ND	ND	ND	250-1000
Mercury, total	0.11 J	ND	1.1	0.05 J	ND	ND	1
Nickel, total	14	5.2	310	ND	ND	ND	100
Selenium, total	ND	0,27	1.7	ND	ND	ND	4
Zinc, total	93	17	7,400	14	17	6.9	350

Note: (1) Compound concentrations are reported in mg/kg (ppm)
B Methylene Chloride was found in Trip Blank (.0056 ppm) and Field Blank (.025 ppm)
J Laboratory estimated value
* Volatile Orgamics, NJDEP Soil Actiom Level is 1 ppm total in soil
+ Base Neutrals NJDEP Soil Action Level is 10 ppm total in soil
ND Not detected

2769K

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TABLE 32

AREA 6 - POWERHOUSE FUEL OIL STORAGE TANKS (SOIL)
SUMMARY OF ANALYTICAL RESULTS (1)

Location	Concentration Total Petroleum Hydrocarbon (2)
PH-01S-D1	ND
PH-01S-02	69
PH-02S-01	ND
PH-02S-02	ND
PH-04S-01	27
PH-05S-01	ND
PH-06S-01	ND
PH-06S-02	ND
PH-07S-01	41
PH-07S-02	250
PH-08S-01	ND
PH-08S-02	ND
PH-09S-01	300
PH-09S-02	2,000
PH-10S-01	5,100
PH-10S-02	3,100
PH-10S-02D	430
PH-11S-01	200,000
PH-11S-02	15,000
PH-12S-01	55
PH-12S-02	ND
PH-13S-01	500
PH-13S-02	210
PH-14S-01	56
PH-14S-02	ND
PH-15S-01	27
PH-15S-02	ND
PH-16S-D1	78
PH-16S-02	ND
PH-17S-01	ND
PH-18S-02	ND

<u>Note</u>: (1) Compound concentrations are reported mg/kg (ppm)
(2) Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene or PAH's.
ND Not detected

2769K

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TABLE 33

AREA 6 – POWERHOUSE FUEL OIL STORAGE TANKS (SOIL)
SUMMARY OF ANALYTICAL RESULTS
POLYNUCLEAR AROMATIC HYDROCARBONS (1)

	PH-02S-02	PH-05S-01(2)	PH-06S-01	PH-07S-02	PH-08S-02	PH-09S-02	PH-10S-02	PH-10S-02D	PH-11S-01	PH-11S-02	PH-12S-02	PH-13S-02
Volatile Organics	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polynuclear Aromatic Hydrocarbons												
Naphthalene	ND	0.021 J	ND	ND	ND	ND	0.05 J	0.048 J	20	NA	ND	ND
Acenaphthylene	ND	0.17 J	ND	ND	ND	ND	ND	0.038 J	ND	NA	ND	0.03 J
Anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND
Phenanthrene	ND	ND	ND	ND	ND	ND	0.077 J	0.068 J	7.4	NA	0.043 J	ND
Flueranthene	ND	ND	ND	1.5	ND	ND	ND	ND	ND	NA	0.086 J	0.5
Pyrene	ND	0.02 J	ND	1.2	ND	ND	ND	ND	ND	NA	ND	0.390
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND
Chrysene	ND	0.089 J	ND	ND	ND	ND	0.044 J	0.071 J	10	NA	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	0.560	ND	ND	ND	ND	ND	NA	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	0.540	ND	ND	ND	ND	ND	NA	ND	ND
Benzo(a)pyrene	ND	ND	ND	0.460	ND	ND	ND	ND	ND	NA	ND	ND
Fluorene	ND	0.079 J	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND
BNA TICs	3.4	1.4	6.7	7.6	ND	ND	NA(3)	NA(3)	NA(3)	NA	14.8	9.9
Total PAHs	ND	0.379	ND	4.26	ND	ND	0.17	0.23	37.4	NA	0.13	0.92
Total BNAs & TICs	3.77	1.77	6.7	11.86	ND	ND	0.17	0.23	37.4	NA	14.93	10.8
PCBs	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 33 (Cont'd)

AREA 6 - POWERHOUSE FUEL OIL STORAGE TANKS (SOIL)
SUMMARY OF ANALYTICAL RESULTS
POLYNUCLEAR AROMATIC HYDROCARBONS (1)

Polynuclear Aromatic Hydrocarbons	PH-14S-01	PH-15S-01	PH-15S-02	PH-16S-01	PH-16S-02	PN-17S-01	PH-18S-01	NJDEP Soil Action Level
Naphthalene	ND	0.022 J	ND	ND	ND	ND	ND	
Acenaphthylene	0.058 J	0.052 J	ND	ND	ND	ND	ND	
Anthracene	0.140 J	0.054 J	ND	ND	ND	ND	ND	
Phenanthrene	ND	0.316 J	0.13 J	ND	0.062 J	0.061 J	0.32 J	
fluoranthene	ND	0.21 J	0.083 J	0.30 J	0.092 J	0.084 J	0.49	
Pyrene	0.330 J	0.24 J	0.1 J	0.30 J	0.065 J	0.68 J	ND	
Benzo(a)anthraceme	0.110 J	0.11 J	0.052 J	0.026 J	ND	ND	ND	
Chrysene	ND	0.20 J	0.081 J	0.037 J	0.076 J	ND	ND	
Benzo(b)fluoranthene	ND	0.087 J	ND	ND	ND	ND	ND	
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	
Fluorene	ND	ND	ND	ND	ND	ND	ND	
BN TICs								
Unknown Compound	9.89	2.69	2.1	0.6	2.1	2.9	4.9	
1,1,2,2-Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	
Total PAHs	0.63	1.29	0.44	0.663	0.295	0.825	0.81	
Total BN TICs	9.89	2.69	2.1	0.6	2.1	2.9	4.9	
Total BUs & TICs	10.52	3.98	2.54	1.26	2.39	3.72	5.71	
BTEX								
Benzene	NA	ND	ND	ND	ND	ND	ND	
Toluene	NA	ND	ND	ND	ND	ND	ND	
Ethyl Benzene	NA	ND	ND	ND	ND	ND	ND	
m,p,o-Xylene	NA	ND	ND	ND	ND	ND	ND	

Note: (1) Compound concentrations are reported in mg/kg (ppm)
(2) All volatiles/semivolatiles analyzed
(3) Nontargeted Library Search was not performed
J Laboratory estimated value
\+ Base Neutrals NJDEP Soil Action Level is 10 ppm total in soil

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2769K

TABLE 34

AREA 7 - FOUNDRY STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS (1)

	FS-01S-01	FS-01S-02	FS-02S-01	FS-02S-02	FS-03S-01	FS-03S-02	NJDEP Soil Action Level
Volatile Organics							
Methylene Chloride	NA	0 .47	NA	0.56	NA	NA	
Trichloroethene	NA	NA	NA	0.20 J	NA	NA	
Tetrachloroethene	NA	NA	NA	0.34 J	NA	NA	
VOC TIC							
Unknown compound	NA	ND	NA	NA	NA	NA	
Total VOCs	NA	0.47	NA	1.1	NA	NA	
Total TICs	NA	ND	NA	ND	NA	NA	
Total VOCs & TICs	NA	0.47	NA	1.1	NA	NA	*
Base Neutrals (ppm)							
Naphthalene	0.15 J	ND	ND	ND	0.037 J	ND	
Acenaphthylene	0.21 J	ND	ND	0.04 J	0.036 J	ND	
Acenaphthene	0.19 J	ND	ND	0.03 J	ND	ND	
Fluorene	ND	ND	ND	0.032 J	ND	ND	
N-Nitrosodiphenylamine	0.76	0.25 J	ND	ND	0.6	0.12 J	
Phenanthrene	0.74	0.023 J	ND	0.15 J	0.13 J	0.063 J	
Anthracene	0.22 J	ND	ND	0.046 J	0.037 J	0.019 J	
Fluoranthene	ND	0.022 J	ND	0.20 J	0.21 J	0.13 J	
Pyrene	1.2	0.022 J	ND	0.25 J	0.23 J	0.10 J	
Benzo(a)anthracene	0.42	ND	ND	0.16 J	ND	0.090 J	
Bis(2-ethylhexyl) Phthalate	ND	0.072 J	ND	0.21 J	0.14 J	0.25 J	25
Chrysene	0.71	ND	ND	0.28 J	0.24 J	0.14 J	
Benzo(b)fluoranthene	ND	ND	ND	0.35 J	ND	ND	
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	0.12 J	
Benza(a)pyrene	0.37	ND	ND	0.15 J	ND	ND	
BN TICs							
Unknown Compound	6.06	6.38	6.4	7.19	4.06	2.3	
Pentachlorobiphenyl Isomer	0.44		ND		0.38		
Tetrachlorobiphenyl Isomer	8.29		89.4		5.93	0.58	
Trichlorobiphenyl Isomer	0.66		31.9		0.57		
Total BNs	4.97	0.389	ND	1.89	1.66	1.03	
Total TICs	15.42	6.32	127.3	7.15	9.64	2.88	
Total BNs and TICs	20.39	6.71	127.3	9.04	11.30	3.91	*

2769K

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TABLE 34 (Cont'd)

AREA 7 – FOUNDRY STORAGE AREA (SOIL)
SUMMARY OF ANALYTICAL RESULTS (1)

Metals	FS-01S-01	FS-01S-010	FS-01S-02	FS-02S-01	FS-02S-02	FS-03S-01	FS-03S-02	NJDEP Soil Action Level
Arsenic, total	3.9	NA	2.6	3.2	2,3	0.62 J	1,8	20
Chromium, total	29	NA	18	24	9.7	46	29	100
Copper, total	140	NA	50	115	7.8	80	70	170
Lead, total	45	NA	ND	38	ND	37	18	250-1000
Mercury, total	46	NA	ND	4.6	ND	0.75	98	1
Nickel, total	15	NA	24	15	6.2	15	29	100
Zinc, total	49	NA	34	80	17	78	200	350
Petroleum Hydrocarbons	1,400	1,500	2,400	420	310	600	7,700	X

Note: (1) Compound concentrations are reported in mg/kg (ppm)
J Laboratory estimated value
* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil
\+ Base Neutrals NJDEP Soil Action Level is 10 ppm total in soil
X Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene or PAH's
ND Not detected
ND Not analyzed for

2769K

ATTACHMENT F133

TABLE 35

AREA 8 - PLANT 4 RECEIVING AREA
SUMMARY OF ANALYTICAL RESULTS (1)

PARAMETER	PR-01S-01	PP-01S-02	PR-02S-01	PR-02S-02	NJDEP Soil Action Level
Volatile Organics	ND	ND	ND	ND	
VOA TICs					
Unknown Compound	ND	10.0	ND	ND	
Total VOAs	ND	ND	ND	ND	
Total VOAs & TICs	ND	10.0	ND	ND	*
BASE/NEUTRALS PARAMETER					
Naphthalene	ND	1.7	ND	ND	
Acenaphthene	ND	.55	ND	ND	
N-Nitrosodiphenylamine	ND	10.0	ND	ND	
Phenanthrene	ND	2.2	ND	ND	
Anthracene	ND	0.17	ND	ND	
Bis(2-ethylhexyl) Phthalate	ND	ND	ND	0.31 J	25
BNA TICs					
Unknown Compound	15.5	26.0	ND	ND	
Unknown Hydrocarbon	ND	5.2	7.6	7.4	
Methylnaphthalene Isomer	ND	4.4	ND	ND	
Dimethylnaphthalene Isomer	ND	1.8	ND	ND	
Trimethylnaphthalene	ND	1.2	ND	ND	
Total BNs	ND	14.62	ND	0.31	
Total TICs	15.5	38.6	7.6	7.4	+
Total BNs & TICs	15.5	53.22	7.6	7.4	

2769K

ATTACHMENT F134

TABLE 35 (Cont'd)

AREA 8 - PLANT 4 RECEIVING AREA
SUMMARY OF ANALYTICAL RESULTS (1)

PARAMETER	PR-01S-01	PR-01S-02	PR-02S-01	PR-02S-02	NJDEP Soil Action Level
METALS					
Arsenic, total	0.6 J	0.61 J	1 J	0.57 J	20
Chromium, total	9.7	14	7.7	8.2	100
Chopper, total	22	8.4	57	5.3	170
Nickel, total	7.1	8.2	7.2	ND	100
Zinc, total	19	25	23	16	350
Petroleum Hydrocarbons	28	4000	ND	150	x

NOTE: (1) Compond concentrations are reported in mg/kg (ppm)

J Laboratory estimated value

* Volatile Organics, NJDEP Soil Action Level is 1 ppm total in soil

+ Base neutrals NJDEP Soil Action Level is 10 ppm total in soil

x Petroleum hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene in PAH's

ND Not detected

2769K

ATTACHMENT E135

TABLE 36

AREA 9 - PLANT 5 EAST SIDE (SOIL)
SUMMARY OF ANALYTICAL RESULTS (1)

	PL-01S-01	PL-01S-02	PL-02S-01	PL-02S-02	NJDEP Soil Action Level
Volatile Organics					
Hethylene Chloride	0.64	0.46	ND	ND	
VOC TICs	ND	ND	ND	ND	
Total VOCs	0.64	0.46	ND	ND	
Total VOC & TICs	0.64	0.46	ND	ND	*
Base Neutrals					
Naphthalene	ND	ND	0.030 J	ND	
Hexachlorobenzene	ND	ND	0.073 J	ND	
Phenanthrene	0.22 J	ND	ND	ND	
Anthracene	0.06 J	ND	ND	ND	
Pyrene	0.40	ND	0.088 J	ND	
Bis(2-ethylhexyl)phthalate	0.33 J	ND	ND	ND	25
Chrysene	ND	ND	0.056 J	ND	
Fluoranthene	0.31 J	ND	0.1 J		
BN TICs					
unknown compound	3.85	0.9	4.83	2.24	
unknown hydrocarbon	5.9	0.39	ND	ND	
Total BNs	I.32	ND	0.34	ND	
Total TICs	9.75	1.29	4.83	2.24	
Total BNs and TICs	I1.07	1.29	5.17	2.24	+
Metals					
Arsenic, total	3	0.76 J	9.6	0.42J	20
Chromium, total	22	9.9	19.	6.2	100
Copper, total	39	6.8	22	ND	170
Lead, total	ND	ND	19	ND	250-1000
Hercury, total	ND	ND	0.073 J	ND	1
Nickel	0.25	ND	17	ND	100
Selenium	ND	ND	1.4	ND	4
Zinc, total	120	17	50	13	350
Petroleum Hydrocarbons	170	67	80	ND	X

Note: (1) Compound concentrations are reported in mg/kg (ppm)
J Laboratory estimated value
* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil
+ Base Neutrals NJDEP Soil Action Level is 10 ppm total in soil
X Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene or PAH's
ND Not detected

ATTACHMENT F136

2769K

TABLE 37

AREA 10 - FUEL OIL STORAGE TANKS
SUMMARY OF ANALYTICAL RESULTS (1)

	FO-01S-01	FO-01S-01D	FO-02S-01	FO-03S-01	FO-04S-01	FO-05S-01	FO-06S-01	FO-07S-01	FO-08S-01	NJDEP Soil Action Level
BTEX										
Toluene	ND	ND	NA	0.17 J	ND	ND	ND	ND	ND	
o-xylene	ND	ND	NA	0.3 J	0.17 J	ND	ND	ND	ND	*
Petroleum Hydrocarbons	23	ND	500	10,000	220	2,800	640	950	170	x
PAHs										
Phenanthrene	NA	NA	NA	ND	NA	NA	ND	1.7	NA	
Pyrene	NA	NA	NA	ND	NA	NA	ND	0.92	NA	
Benzo(a)anthracene	NA	NA	NA	ND	NA	NA	ND	0.28	NA	
Chrysene	NA	NA	NA	ND	NA	NA	ND	0.56	NA	
Total PAHs	NA	NA	NA	ND	NA	NA	ND	3.46	NA	
BN TICs										
Unknown Compound	NA	NA	NA	ND	NA	NA	1.4	ND	NA	
Total PAH & TICs	NA	NA	NA	ND	NA	NA	1.4	3.46	NA	+

NOTE: Compound concentrations are reported in mg/kg (ppm)
J - Laboratory estimated value
* - Volatile Organics, NJDEP Soil Action Level is 1 ppm total in soil
+ - Base Neutrals, NJDEP Soil Action Level is 10 ppm total in soil
x - Petroleum hydrocarbons, NJDEP Soil Action Level is 100 ppm in soil, unless primarily benzene or PAH's.
ND - Not detected
NA - Not analyzed for

ATTACHMENT F137

2769K

TABLE 38

BACKGROUND BORING (SOIL)
SUMMARY OF ANALYTICAL RESULTS(1)

	BK-01S-01		NJDEP Action Soil Level
Volatile Organics	ND		
VOC TICs			
4-Methyl-2-Pentanone	2.7		
Total VOC's	ND		
Total TIC's	2.7		
Total VOCs & TICs	2.7		*
Base Neutrals			
Bis(2-ethylhexyl)Phthalate	0.13	J	
BN TICs	3.4		
Total BNs & TICs	3.5		+
Petroleum Hydrocarbons	ND		X
Metals			
Arsenic	1.5		20
Chromium	8.2		100
Copper	6.7		170
Nickel	6.1		100
Zinc	20		350

Note:
(1) Compound concentrations are reported in mg/kg (ppm)
J Laboratory estimated value
* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil
+ Base Neutrals NJDEP Sdil Action Level is 10 ppm total in soil
X Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene or PAH's
ND Not detected

2769K

ATTACHMENT F138

TABLE 39

AREA 11 - WESTERN DRAINAGE DITCH (SEDIMENT)
SUMMARY OF ANALYTICAL RESULTS(1)

Parameter	WD-01	WD-01D	WD-02	WD-03	WD-04	WD-05	NJDEP Soil Action Level
Volatile Organics	ND	ND	ND	ND	ND	NA	
VOC TICs	ND	ND	ND	ND	ND	NA	
Total VOAs and TICs	ND	ND	ND	ND	ND	NA	*
Base Neutrals							
Naphthalene	0.28 J	ND	ND	ND	ND	ND	
Acenaphthene	0.67	ND	ND	0.22 J	ND	ND	
Phenanthrene	6.3	4.3 J	ND	2.5	5.2	ND	
Anthracene	1.2	ND	ND	0.52 J	ND	ND	
Dibutyl Phthalate	0.81	ND	ND	ND	ND	ND	
Fluoranthene	0.97	6.5	ND	5.5	11.	4.0	
Pyrene	7.7	5.6 J	4.1	3.3	10.	4.0	
Benzo(a)anthracene	ND	ND	ND	2.1	4.9	ND	
Bis(2-ethylhexyl)Phthalate	ND	ND	ND	1.4	ND	ND	
Chrysene	6.2	ND	ND	4.0	ND	ND	
Benzo(b)fluoranthene	ND	ND	ND	12.	6.8	ND	
Benzo(k)fluoranthene	ND	ND	ND	15.	6.8	ND	
Benzo(a)pyrene	ND	ND	ND	11.	4.5	ND	
BN TICs							
Unknown Compound	55	ND	ND	65.8	25	ND	
Trichlorobiphenyl Isomer	384	ND	ND	ND	ND	ND	
Tetrachlorobiphenyl Isomer	1103	30	ND	ND	ND	ND	
Pentachlorobipheyl Isomer	86	ND	ND	ND	ND	ND	
Total BNs	24.13	16.4	4.1	57.54	39.2	8	
Total BN TICs	1628	30	ND	65.8	25	ND	
Total BNs and TICs	1652.13	46.3	4.1	123.3	64.2	8	+
Metals (ppm)							
Antimony, total	2.6 J	1.5 J	1.6 J	0.63 J	1.1 J	NA	10
Arsenic, total	9.8	8.5	3.1	5.9	16	NA	20
Cadmium, total	9.0	8.5	16	2.8	12	NA	3
Chromium, total	76.	83.0	2,700.	10.	440.	NA	100
Copper, total	210.	200.0	3,300.	72.	850.	NA	170
Lead, total	950.	1,100.	440.0	160.	690.	NA	250-1000
Mercury, total	1.2	0.48	0.26 J	0.53	0.51	NA	1
Nickel, total	39.	42.	57.0	18.	51.	NA	100
Silver	ND	7.4	40.0	ND	640.	NA	5
Zinc, total	780.	400.	1,700.	340.	840.	NA	350
Cyanide	ND	ND	ND	ND	ND	ND	

ATTACHMENT F 139

2769K

TABLE 39 (Cont'd)

AREA 11 - WESTERN DRAINAGE DITCH (SEDIMENT)
SUMMARY OF ANALYTICAL RESULTS(1)

Parameter	WD-01	WD-010	WD-02	WD-03	WD-04	WD-05	NJDEP Soil Action Level
Polychlorinated Biphenyls							
Aroclor 1248	320	100	ND	ND	ND	NA	
Aroclor 1254	ND	ND	1.3	0.52	1.6	NA	
Petroleum Hydrocarbons	5,000	4,500	4,600	1,600	5,300	770	X

NOTE: (1) Compound concentrations ae reported in mg/kg (ppm)

3 Laboratory estimated value

* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil

\+ Base Neutrals NJDEP Soil Action Level is 10 ppm total in soil

x Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil unless primarily Benzene or PAH's

ND Not detected

NA Not analyzed for

ATTACHMENT F140

2769K

TABLE 40

AREA 12 - EQUALIZATION BITOH (SEDIMENT)
SUMMARY OF ANALYTICAL RESULTS (1)

	Concentration EQ-01 (ppm)	NJOEP Soil Action Level
Volatile Organics and TICs	ND	*
Base Neutrals		
Naphthalene	12	
Acenaphthalene	10	
Phenanthrene	120	
Anthracene	29	
Fluoranchene	17C	
Pyrene	160	
Benzo(a)anthracene	71	
Chrysene	100	
Benzo(b)fluoranthene	53	
Benzo(k)fluoranthene	64	
Benzo(a)pyrene	59	
BN TICs		
Unknown Componnd	106	
Methylanthracene isomer	24	
Nethylpyrene isomer	55	
Methylbenzo(a)anthracene isomer	22	
Benzofluoranthene isomer	35	
Total BNs	842	
Total TICs	242	
Total BNs and TICs	1C84	+
Cyanide	ND	
Polychlorinated Biphenyls	ND	
Petroleum Hydrocarbons	38,000	X

Note: (1) Compound concentrations are reported in mg/kg (ppm)
* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil
\+ Base Neutrals NJOEP Soil Action Level is 10 ppm total in soil
X Petroleum Hydrocarbons NJOEP Soil Action Level is 100 ppm total in soil, enless primarily Benzene or PAH's
ND Not detected

2769K

ATTACHMENT E141

TABLE 41

AREA 13 - EASTERN DRAINAGE CHANNEL (SEDIMENT)
SUMMARY OF ANALYTICAL RESULTS (1)

	ED-01	ED-02	ED-03	NJDEP Soil Action Level
Volatile Organics				
Methylene Chloride	1.2	0.54	0.56	
VOA TICs				
Unknown Compound	1.4	ND	ND	
Total VOCs	1.2	0.54	0.56	
Total TICs	1.4	ND	ND	*
TOTAL VOCs and TICs	2.6	0.54	0.56	
Metals				
Antimony, total	1.6J	0.73J	0.62J	10
Arsenic, total	1.4	5.1	6.6	20
Cadmium, total	ND	3.	2.8	3
Chromium, total	19.	79.	69.	100
Copper, total	39.	70.	130.	170
Lead, total	51.	180.	280.	250-1000
Mercury, total	ND	0.57	0.46	1
Nickel, total	15	30.	22.	100
Silver	ND	4.6	61.	5
Zinc, total	78.	290.	410.	350
Petroleum Hydrocarbons	240	2600.	2300.	X

Note: (1) Compound concentrations are reported in mg/kg (ppm)
J Laboratory estimated value
* Volatile Organics NJDEP Soil Action Level is 1 ppm total in soil
X Petroleum Hydrocarbons NJDEP Soil Action Level is 100 ppm total in soil, unless primarily Benzene or PAH's

ATTACHMENT F142

2769K

TABLE 42

GROUNDWATER SAMPLING PROGRAM
SUMMARY OF ANALYTICAL RESULTS (1)

PARAMETER	CS-05A-01	CS-06A-01	CS-07A-01	CS-11A-01	CS-12A-01	CS-13A-01	CS-14A-01	CS-15A-01	CS-15A-01D
Volatile Organics									
Vinyl Chloride	ND	ND	ND	ND	ND	32	ND	2200	1800
Chloroethane	ND	ND	ND	ND	ND	11	ND	48	52
Methylene Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	10	9.7 J
1,1-Dichloroethane	ND	14	ND	ND	ND	29	ND	240	250
trans-1,2-Dichloroethene	ND	18	ND	ND	18	26	ND	1800	2200
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	2.7 J	2.7 J
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	40	41
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	150	160
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	48	54
m-Xylene	ND	ND	ND	ND	ND	ND	ND	77	85
o,p-Xylene	ND	ND	ND	ND	ND	ND	ND	260	280
VOC TICs									
Unknown Compound	ND	6.1	ND	ND	ND	ND	ND	5.3	11.2
1,1,2-Trichloro-1,2,2-trifluoroethene	2.5	ND	ND	ND	4.4	ND	ND	ND	ND
Substituted cyclic compound	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	89	ND	ND
1,2-dichloro-1,1,2-trifluoroethane	ND	ND	ND	ND	ND	ND	ND	63	61
Total TICs	2.5	6.1	ND	ND	4.4	ND	89	68.3	72.2
Total VOCs	ND	32	ND	ND	18	98	ND	4875.7	4934.4
Total VOCs & TICs	2.5	38.1	ND	ND	22.4	98	89	4944	5006.6
Petroleum Hydrocarbons	NA	NA	NA	NA	ND	NA	NA	NA	NA

ATTACHMENT F43

2769K

TABLE 42 (CONT'D)

GROUNDWATER SAMPLING PROGRAM
SUMMARY OF ANALYTICAL RESULTS (1)

SAMPLE DESIGNATION

PARAMETER	CS-16A-01	CS-17A-01	CS-18A-01	OS-01A-1	WT-01A-01	WT-01A-010	BK-01A-01
Volatile Organics							
Vinyl Chloride	660	ND	230	20,000	680	NA	ND
Chloroethane	83	ND	290	54	9.1 J	NA	ND
Methylene Chloride	14	ND	ND	33 J	ND	NA	ND
1,1-Dichloroethene	30	ND	11	1,500	ND	NA	ND
1,1-Dichloroethane	40000	ND	230	7,400	110	NA	ND
trans-1,2-Dichloroethene	3400	ND	330	180,000	620	NA	ND
1,2-Dichloroethane	21	ND	ND	8.2	NDJ	NA	ND
1,1,1-Trichloroethane	2300	ND	110	16,000	ND	NA	ND
Trichloroethene	34	ND	10	12,000	ND	NA	ND
1,1,2-Trichloroethane	18	ND	ND	100	ND	NA	ND
Benzene	ND	ND	34	240	4.2 J	NA	ND
Tetrachloroethene	6.4 J	ND	38	510	ND	NA	ND
Toluene	66	ND	31	5,500	14	NA	ND
Ethylbenzene	ND	ND	12	780	ND	NA	ND
m-Xylene	ND	ND	12	1,800	ND	NA	ND
o,p-Xylene	9.4 J	ND	21	1,600	ND	NA	ND
Chloroform	ND	ND	ND	130	ND	NA	ND
VOC TICs							
Unknown Compound	25	ND	ND	210	NA	NA	ND
1,1,2-Trichloro-1,2,2-trifluoroethene	9.2	ND	120	2,100	2.4	NA	ND
Substituted cyclic compound	ND	ND	6.4	ND	ND	NA	ND
Acetone	ND	ND	ND	ND	ND	NA	170
1,2-Dichloro-1,1,2-trifluoroethene	ND	ND	91	1,100	8.2	NA	ND
Total VOCs	46641.8	ND	1371	247,655.2	1437.3	NA	ND
Total VOC TICs	34.2	ND	217.4	2,410	10.6	NA	170
Total VOCs & TICs	46676	ND	1588.4	250,065.2	1447.9	NA	170
Petroleum Hydrocarbons	NA	ND	NA	ND	ND	ND	ND

ATTACHMENT E44

2769K

TABLE 42 (Cont'd)

GROUNDWATER SAMPLING PROGRAM
SUMMARY OF ANALYTICAL RESULTS (1)

Semivolatiles	CS-05A-01	CS-06A-01	CS-07A-01	CS-11A-01	CS-12A-01	CS-13A-01	CS-14A-01	CS-15A-01	CS-15A-01D
N-Nitrosodiphenylamine	10	14	15	18	ND	ND	NA	ND	ND
Benzidine	ND	ND	2.1J	ND	ND	ND	NA	ND	ND
2-Methylphenol	ND	ND	ND	ND	ND	ND	NA	6.9J	5.0J
4-Methylphenol	ND	ND	ND	ND	ND	ND	NA	29	24
2,4-Dimethylphenol	ND	ND	ND	ND	ND	ND	NA	ND	3.0J
Napththalene	ND	ND	ND	ND	ND	ND	NA	4.4J	6.7J
Phenanthrene	ND	ND	ND	ND	ND	ND	NA	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	NA	ND	ND
Dibutyl Phthalate	ND	ND	ND	ND	ND	ND	NA	ND	ND
Fluoranthene	ND	ND	2.9J	ND	ND	ND	NA	ND	ND
Pyrene	ND	ND	2.1	ND	ND	ND	NA	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND	ND	NA	ND	ND
Bis(2-ethylhexyl) Phthalate	7.2J	32	8.9J	5.5J	19	7.6J	NA	16	6.7 J
Chrysene	ND	ND	1.9J	ND	ND	ND	NA	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	ND	NA	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	NA	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND	ND	NA	ND	ND
BNA TICs									
Unknown Compound	360	61	155	41	21	ND	NA	84.2	114.8
Dimethylbenzene Isomer	ND	ND	ND	ND	ND	ND	NA	260	330
Trimethylbenzene Isomer	ND	ND	ND	ND	ND	ND	NA	66	90
Ethylmethylbenzene	ND	ND	ND	ND	ND	ND	NA	19	81
Ethylbenzene	ND	ND	ND	ND	ND	ND	NA	30	39
Methylbenzene	ND	ND	ND	ND	ND	ND	NA	61	88
Total BNAs	7.2	46	30.8	23.5	19	7.6		40.3	45.4
Total TICs	360	61	155	41	21	ND	NA	520.2	742.8
Total BNAs and TICs	367.2	107	185.8	64.5	40	7.6	NA	560.5	788.2

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ATTACHMENT E 145

TABLE 42 (Cont'd)

GROUNDWATER SAMPLING PROGRAM
SUMMARY OF ANALYTICAL RESULTS (1)

Semivolatile Organics	CS-16A-01	CS-17A-01	CS-18A-01	DS-01A-01	WT-01A-01 (2)	WT-01A-01D	BK-01A-01	NJAC 7:9-6 Groundwater Stds.
N-Nitrosodiphenylamine	ND	ND	19	ND	4.6J	NA	ND	
Benzidine	ND	ND	ND	ND	ND	NA	ND	
2-Methylphenol	ND	ND	ND	ND	ND	NA	ND	
4-Methylphenol	ND	ND	ND	250	ND	NA	ND	
2,4-Dimethylphenol	ND	ND	ND	ND	ND	NA	ND	
Naphthalene	ND	ND	2.8J	ND	ND	NA	ND	
Phenanthrene	ND	ND	ND	ND	ND	NA	ND	
Anthracene	ND	ND	ND	ND	ND	NA	ND	
Dibutyl Phthalate	ND	ND	ND	ND	ND	NA	ND	
Fluoranthene	ND	ND	ND	ND	ND	NA	ND	
Pyrene	ND	ND	ND	ND	ND	NA	ND	
Benzo(a)anthracene	ND	ND	ND	ND	ND	NA	ND	
Bis(2-ethylhexyl) Phthalate	7.1J	13	28	46	1.3J	NA	11	
Chrysene	ND	ND	ND	ND	ND	NA	ND	
Benzo(b)fluoranthene	ND	ND	ND	ND	ND	NA	ND	
Benzo(k)fluoranthene	ND	ND	ND	ND	ND	NA	ND	
Benzo(a)pyrene	ND	ND	ND	ND	ND	NA	ND	
Phenol	ND	ND	ND	120	ND	NA	ND	
4-Chloro-3-methylphenol	ND	ND	ND	7.25	ND	NA	ND	
BNA TICs								
Unknown Compound	204	19	ND	702	ND	NA	490	
Di-methylbenzene Isomer	ND	ND	28	690	4.6	NA	ND	
Trimethylbenzene Isomer	ND	ND	ND	860	ND	NA	ND	
Ethylmethylbenzene Isomer	ND	ND	ND	290	5.2	NA	ND	
Ethylbenzene Isomer	ND	ND	ND	1600	ND	NA	ND	
Methylbenzene	ND	ND	ND	2000	ND	NA	ND	
Total BNAs	7.1	13	21.8	377.25	5.9	NA	11	
Total TICs	204	19	28	6142	9.8	NA	490	
Total BNA's and TIC's	211.1	32	49	6519.2	15.7	NA	501	
Metals								
Arsenic	NA	NA	NA	13	8.1J	7.4J	ND	50
Chromium	NA	NA	NA	52	ND	ND	ND	
Silver	NA	NA	NA	ND	ND	20 J	ND	50
Mercury	NA	NA	NA	ND	0.56J	ND	ND	2
Zinc	NA	NA	NA	34	ND	21.	27	

Notes: (1) Compound concentrations reported in ug/l (ppb)
(2) Analyzed for Base Neutral only; does not include Acid Extractable compounds.
J Laboratory estimated value
ND Not detected
NA Not analyzed for

ATTACHMENT F146

2769K

TABLE 43

SUMMARY OF ANALYTICAL RESULTS
FIELD BLANKS (ug/l)

	FB01	FB02	FB03	FB04	FB05	FB06	FB07	FB08	FB09	FB10
Volatile Organics										
Methylene Chloride	3.3J	25	56	ND	5.8J	NA	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	34	NA	ND	ND	ND	ND
VOC TICs										
2-Propanone	ND	ND	ND	ND	88	NA	ND	ND	ND	ND
1,1,1-Trichloro-1,2,2-trifluoroethane	ND	ND	ND	ND	1.9	NA	ND	ND	ND	ND
Total VOCs	3.3	25	56	ND	40	NA	ND	ND	ND	ND
Total TICs	ND	ND	ND	ND	90	NA	ND	ND	ND	ND
Total VOCs + TICs	3.3	25	56	ND	130	NA	ND	ND	ND	ND
Base Neutrals										
Bis(2-ethylhexyl)Phthalate	ND	4.1J	0.59J	ND(A)	23(A)	ND	ND(A)	ND(A)	3.7J	1.7
Diethyl Phthalate	ND	ND	ND	ND	40	ND	ND	ND	ND	ND
BNA TICs										
Unknown Compound	ND	9.2	ND	ND	ND	ND	ND	205	ND	ND
Total BN	ND	4.1	0.59	ND	63	ND	ND	ND	3.7	1.7
Total BNA TICs	ND	9.2	ND	ND	ND	ND	ND	205	ND	ND
Total BNA + TICs	ND	13.3	0.59	ND	63	ND	ND	205	3.7	1.7
Petroleum Hydrocarbons	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals										
Zinc	ND	ND	ND	NA	NA	NA	14J	NA	23	73
Cyanide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs	NA	ND	NA	ND	NA	NA	NA	NA	NA	NA

(A) All BNs + AEs
(B) Benzene, Toluene, Ethylbenzene and Xylene

2769K

ATTACHMENT E

TABLE 43 (Cont'd)

SUMMARY DF ANALYTICAL RESULTS
FIELD BLANKS (ug/l)

	FB11	FB12	FB12A	FB14	FB15	FB16	FB17	FB18	FB19	FB20	FB21
Volatile Organics											
Methylene Chloride	ND	ND	ND	ND	NA	4.7J	5.4J	6.2J	ND	2.8J	ND(B)
VDC TICs											
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	29	ND	ND	NA	ND	ND	3.9	ND	ND	ND
Unknown Compound	ND	ND	ND	ND	NA	ND	ND	ND	390	ND	ND
2-Propanone	ND	ND	ND	ND	NA	ND	ND	ND	ND	2.8	ND
Total VDCs	ND	ND	ND	ND	NA	4.7	5.4	6.2	ND	2.8	
Total TICs	ND	29	ND	ND	NA	ND	ND	3.9	390	2.8	ND
Total VDCs + TICs	ND	29	ND	ND	NA	4.7	5.4	10	390	5.6	ND
Base Neutrals											
Bis(2-ethylhexyl)Phthalate	NA	ND	ND	ND	NA	2.0J	ND	ND	7.5J(A)	2.3J	ND
N-Nitrosodiphenylamine	NA	ND	ND	ND	NA	ND	ND	ND	ND	9.7J	ND
BNA TICs											
Unknown Compound	ND	19	ND	23	NA	ND	ND	ND	ND	ND	51.6
Unknown Hydrocarbon	6.3	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND
Dichlorophenol Isomer	ND	9	ND	ND	NA	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	60
Total BNs	NA	ND	ND	ND	NA	2.0	ND	ND	7.5		ND
Total BN TICs	6.3	28	ND	23	NA	ND	ND	ND	ND	ND	111.6
Total BNA + TICs	6.3	28	ND	23	NA	ND	ND	ND	7.5		111.6
Petroleum Hydrocarbons	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals											
Zinc	150	ND	ND	260	NA	NA	ND	850J	NA	450	NA
Cyanide	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA
PCBs	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA

(B) BTEX

2769K

ATTACHMENT E 148

TABLE 43 (Cont'd)

SUMMARY OF ANALYTICAL RESULTS
FIELD BLANKS (ug/l)

	FB22	FB23	FB24	FB25
Volatile Organics	ND	ND(B)	ND	ND(B)
VOC TICs				
2-Propanone	290	ND	26	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	3.7	ND	ND	ND
Total VOCs	ND	ND	ND	ND
Total TICs	294	ND	26	ND
Total VOCs + TICs	294	ND	26	ND
Base Neutrals				
Bis(2-ethylhexyl)phthalate	4.9J	ND(C)	ND	ND
BNA TICs				
Unknown Compound	33	ND	ND	ND
Total BN	4.9	ND	ND	ND
Total BN TICs	33	ND	ND	ND
Total BNs and TICs	38	ND	ND	ND
Petroleum Hydrocarbons	ND	ND	ND	ND
Metals				
Zinc	23	NA	22	NA

(B) Benzene, Toluene, Ethylbenzene and Xylene
(C) Acid Extractables plus PAHs

2769K

TABLE 44

SUMMARY DF ANALYTICAL RESULTS
TRIP BLANKS (ug/l)

	TB1	TB2	TB3	TB4	TB5	TB6	TB7	TB8	TB8A	TB10	TB11	TB12	TB13	TB4490
Volatile Organics														
Methylene Chloride	4.9J	5.6J	3.8J	ND	ND	ND	4.2J	3.2J	ND	18	19	ND	ND	26
VOC TICs														
2-Propanone	ND	ND	110	ND	ND	260	ND	ND	ND	ND	160	ND	69	26
1,1,2-Trichloro-1,2,2-trifluoroethane		ND	3.2	ND	ND	ND	ND	ND	ND	ND	1.7	ND	ND	ND
Unknown Compound	ND	ND	ND	ND	ND	ND	ND	ND	ND	180	ND	ND	ND	ND
Total VDCs	4.9	5.6	3.8	ND	ND	ND	4.2	3.2	ND	18	19	ND	ND	26
Total TICs	ND	ND	113.2	ND	ND	260	ND	ND	ND	180	162	ND	69	26
Total VDCs + TICs	4.9	5.6	117	ND	ND	260	4.2	3.2	ND	198	181	ND	69	52
PCBs	NA	NA	NA	NA	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA

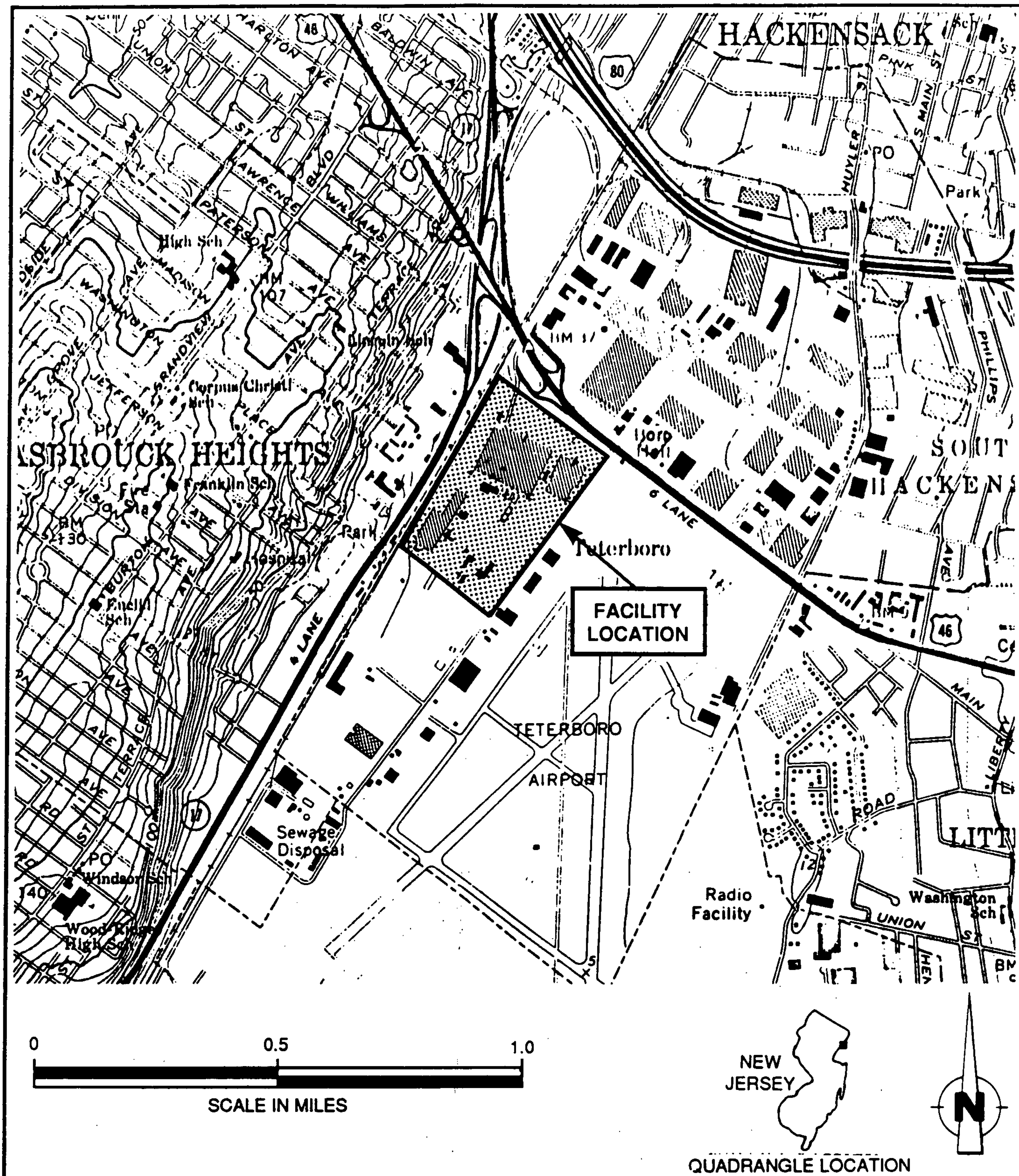
ATTACHMENT F150

2769K

TABLE 45

Recommendations for Cleanup or Additional Characterization
Allied-Signal Aerospace Facility

AREA	RECOMMENDATION
1. Chemical Storage Area	Prepare Cleanup Plan. Evaluate groundwater and soil remediation for VOCs and BNCs.
2. Waste Solvent Storage Tanks	Install additional wells to sample groundwater for VOCs. Prepare Cleanup Plan for soil and groundwater remediation for VOCs.
3. Waste Oil/Solvent Storage Tanks	Install additional wells to sample groundwater for VOCs. Prepare Cleanup Plan for soil and groundwater remediation for VOCs.
4. Jet Fuel Storage Tanks	Perform additional soil sampling for BTEX.
5. Hazardous Waste Storage Area	Perform additional soil sampling for VOCs and metals.
6. Powerhouse Fuel Oil Storage Tank	Prepare Cleanup Plan for TPHs in soil.
7. Foundry Storage Area	Perform additional soil sampling for mercury.
8. Plant Four Receiving	Perform additional sampling for BNCs.
9. Plant Five (East)	No Cleanup Plan or additional sampling.
10. Fuel Oil Storage Tanks	Prepare Cleanup Plan for TPHs
11. Western Drainage Ditch	No Cleanup Plan or additional sampling.
12. Equalization Ditch	No Cleanup Plan or additional sampling.
13. Eastern Drainage Ditch	No Cleanup Plan or additional sampling.



NOTE: BASE MAP FROM USGS WEEHAWKEN QUADRANGLE, 1967

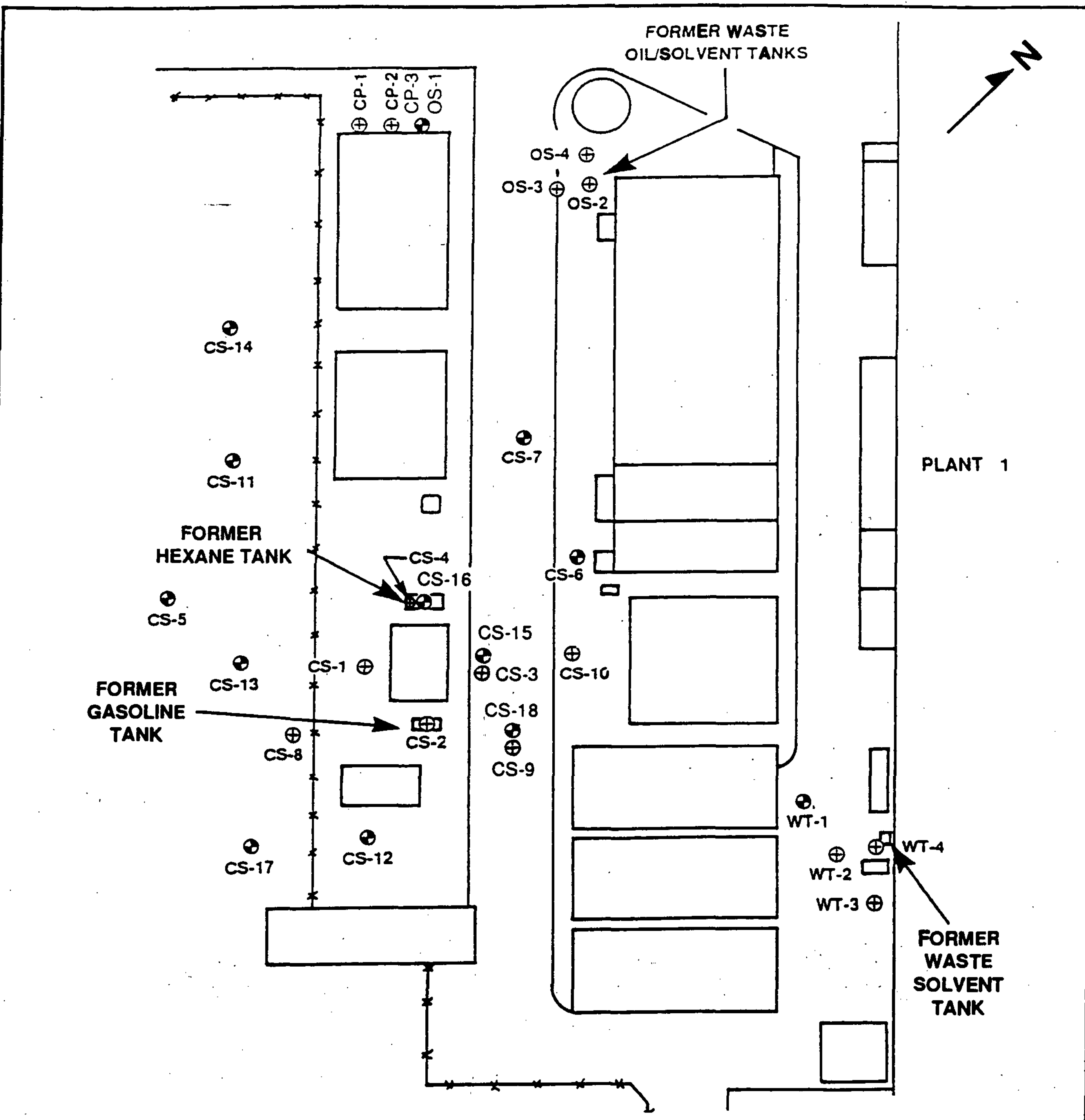
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

ALLIED SIGNAL FACILITY
LOCATION MAP

FIGURE 1

ATTACHMENT F 152



SOIL BORING LOCATION & NUMBER

CS-1 ⊕ AREA 1- CHEMICAL STORAGE AREA

WT-1 ⊕ AREA 2- WASTE SOLVENT TANKS

OS-1 ⊕ AREA 3- WASTE OIL/SOLVENT TANKS

CP-1 ⊕ AREA 5- HAZARDOUS WASTE STORAGE AREA

SOIL BORING CONVERTED TO MONITORING WELL

25 0 50 100 FT

SCALE

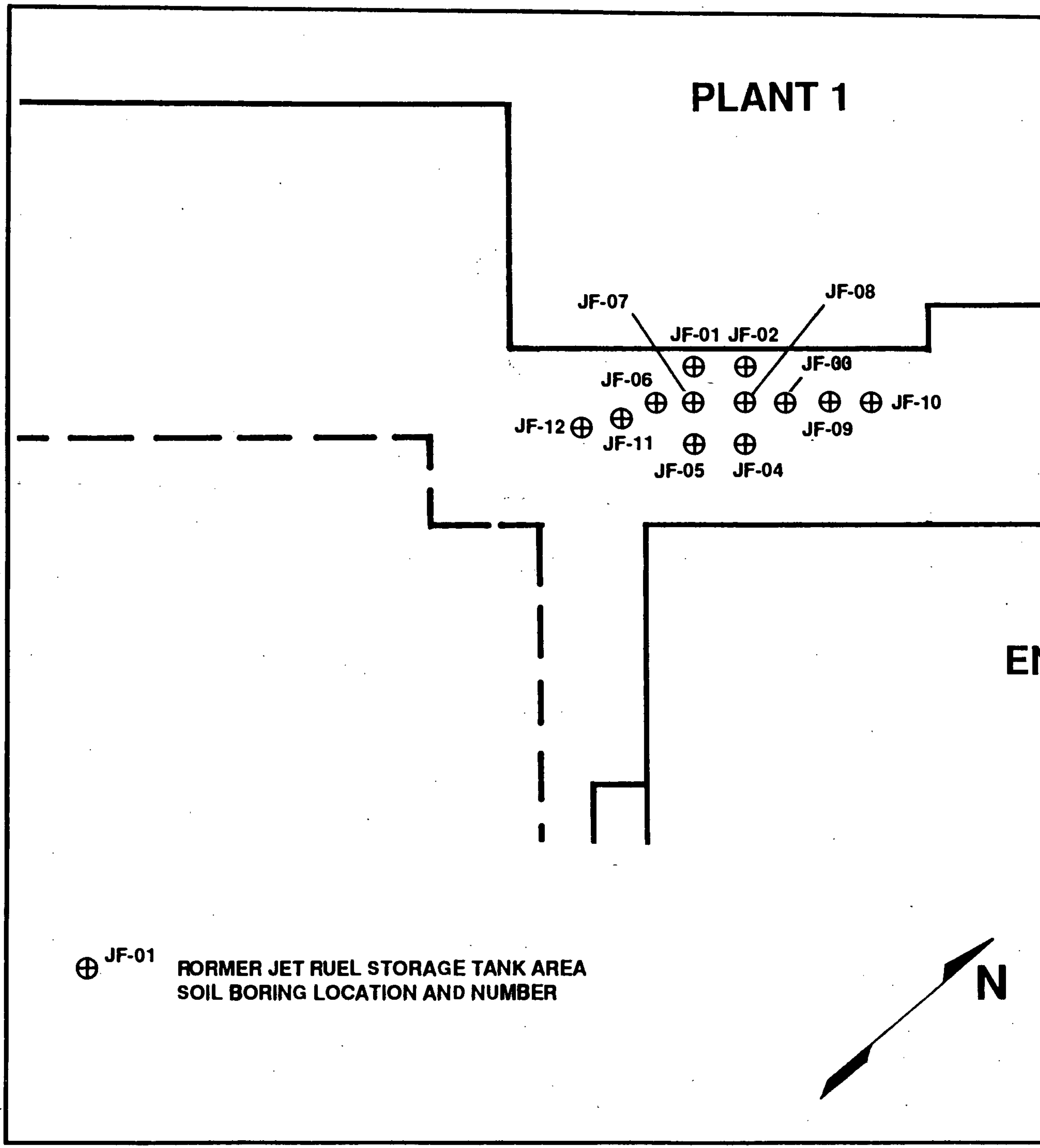
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

SOIL BORING LOCATIONS
IN AREAS 1, 2, 3, AND 5

FIGURE 4

ATTACHMENT E 153



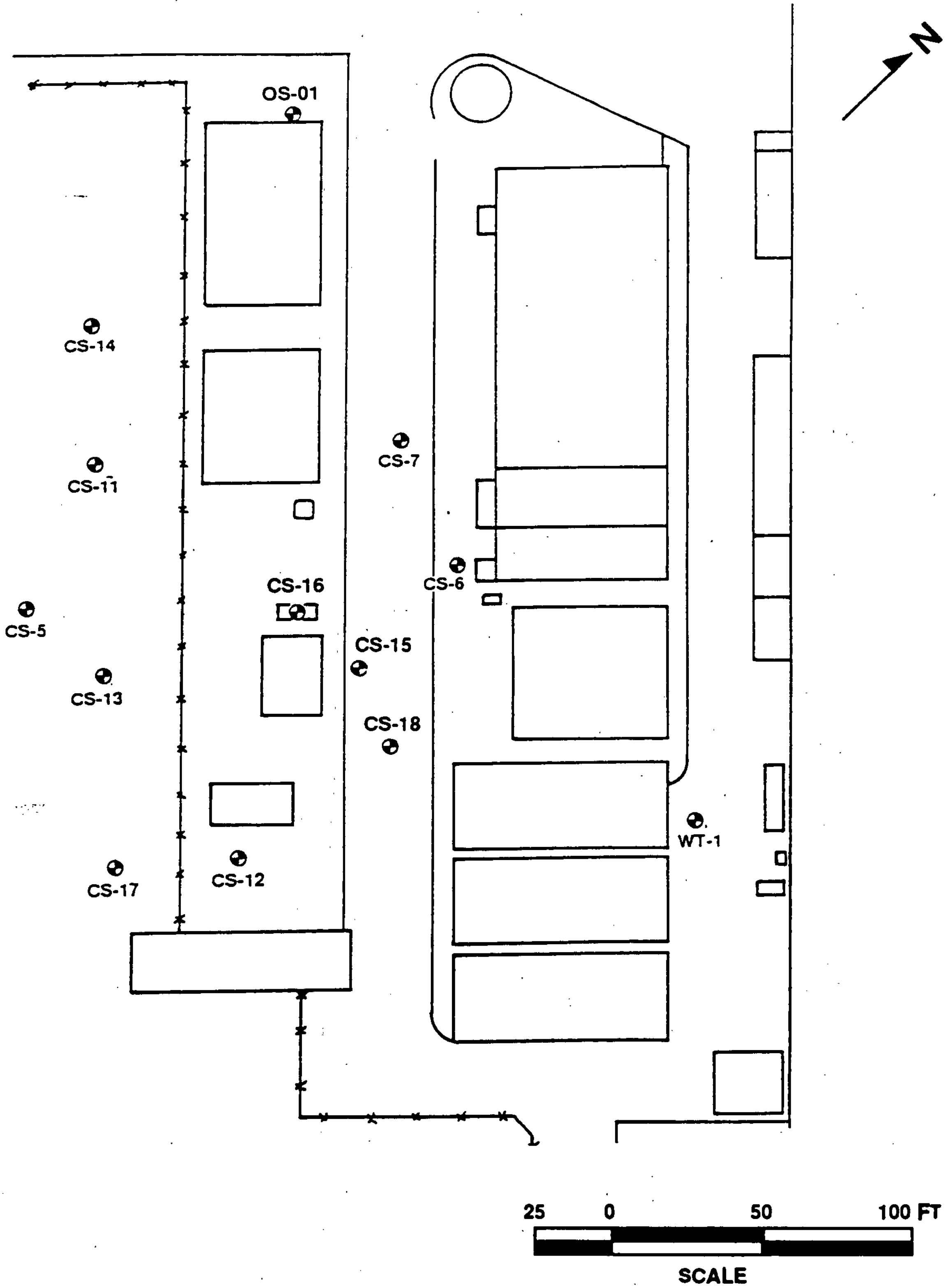
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

SOIL BORING LOCATIONS
IN AREA 4

FIGURE 5

ATTACHMENT E154



MONITORING WELL LOCATION & NUMBER

CS-5 AREA 1- CREMICAL STORAGE AREA

WT-1 AREA 2- WASTE SOLVENT TANK

OS-1 AREA 3- WASTE OIL/SOLVENT TANKS

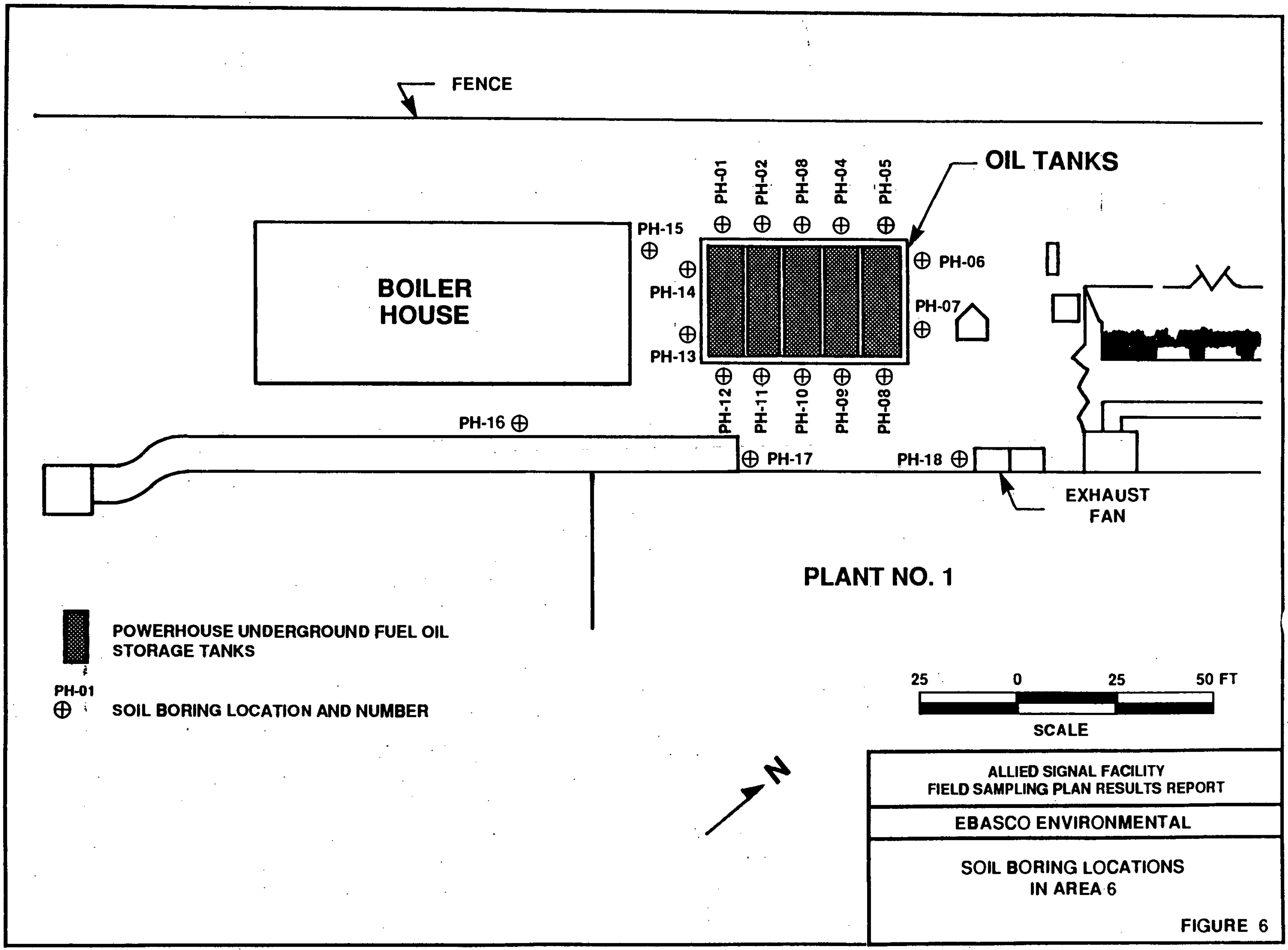
ALLIED SIGNAL FACILITY
RELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

GROUNDWATER
MONITORING WELL
LOCATIONS

FIGURE 9

ATTACHMENT F155



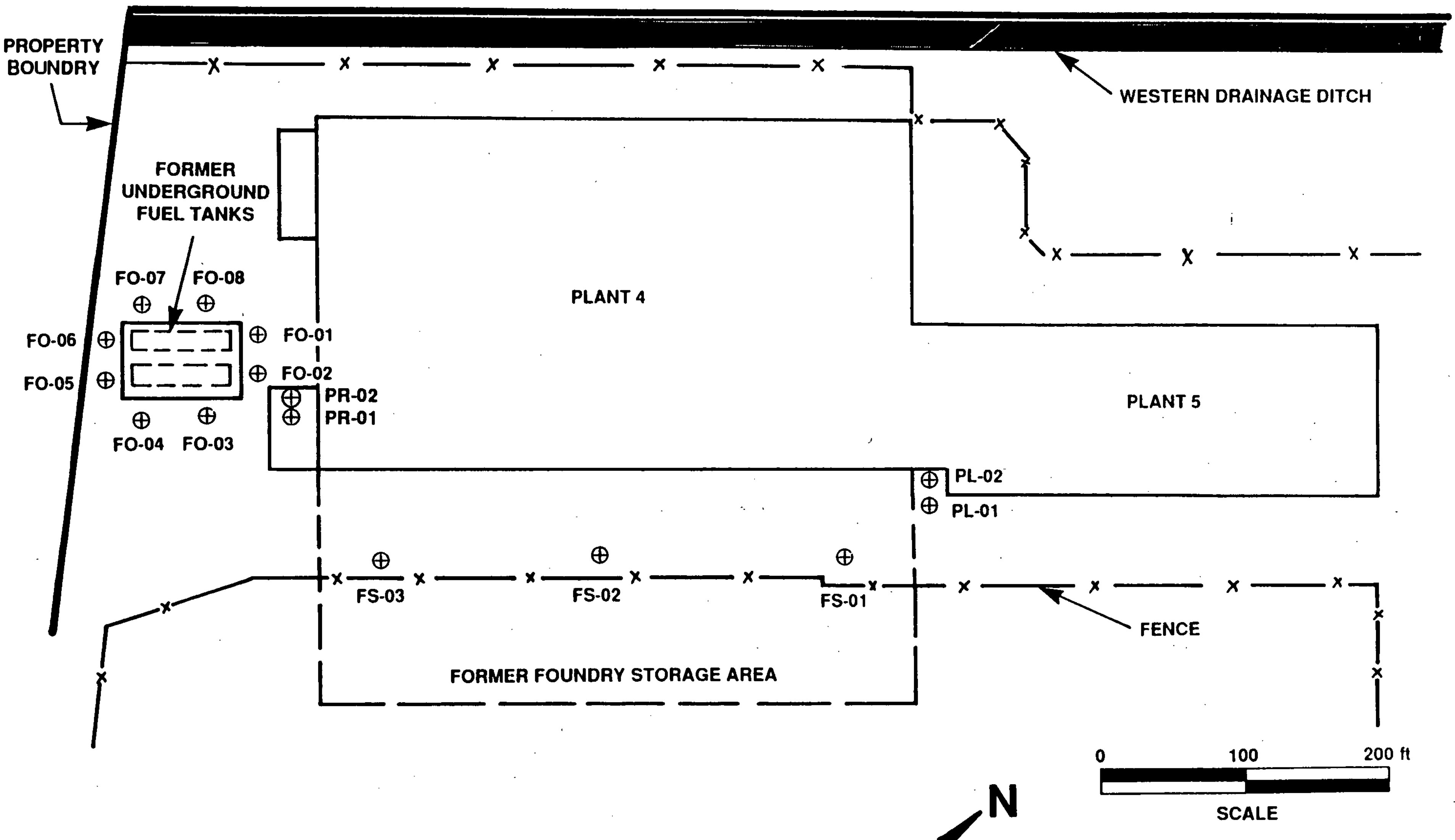
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

SOIL BORING LOCATIONS
IN AREA 6

FIGURE 6

ATTACHMENT F156



SOIL BORING LOCATION AND NUMBER

- ⊕ FS-01 AREA 7 - FOUNDRY STORAGE AREA
- ⊕ PR-01 AREA 8 - PLANT 4 RECEIVING
- ⊕ PL-01 AREA 9 - PLANT 5 (EAST)
- ⊕ FO-01 AREA 10 - FUEL OIL STORAGE TANKS

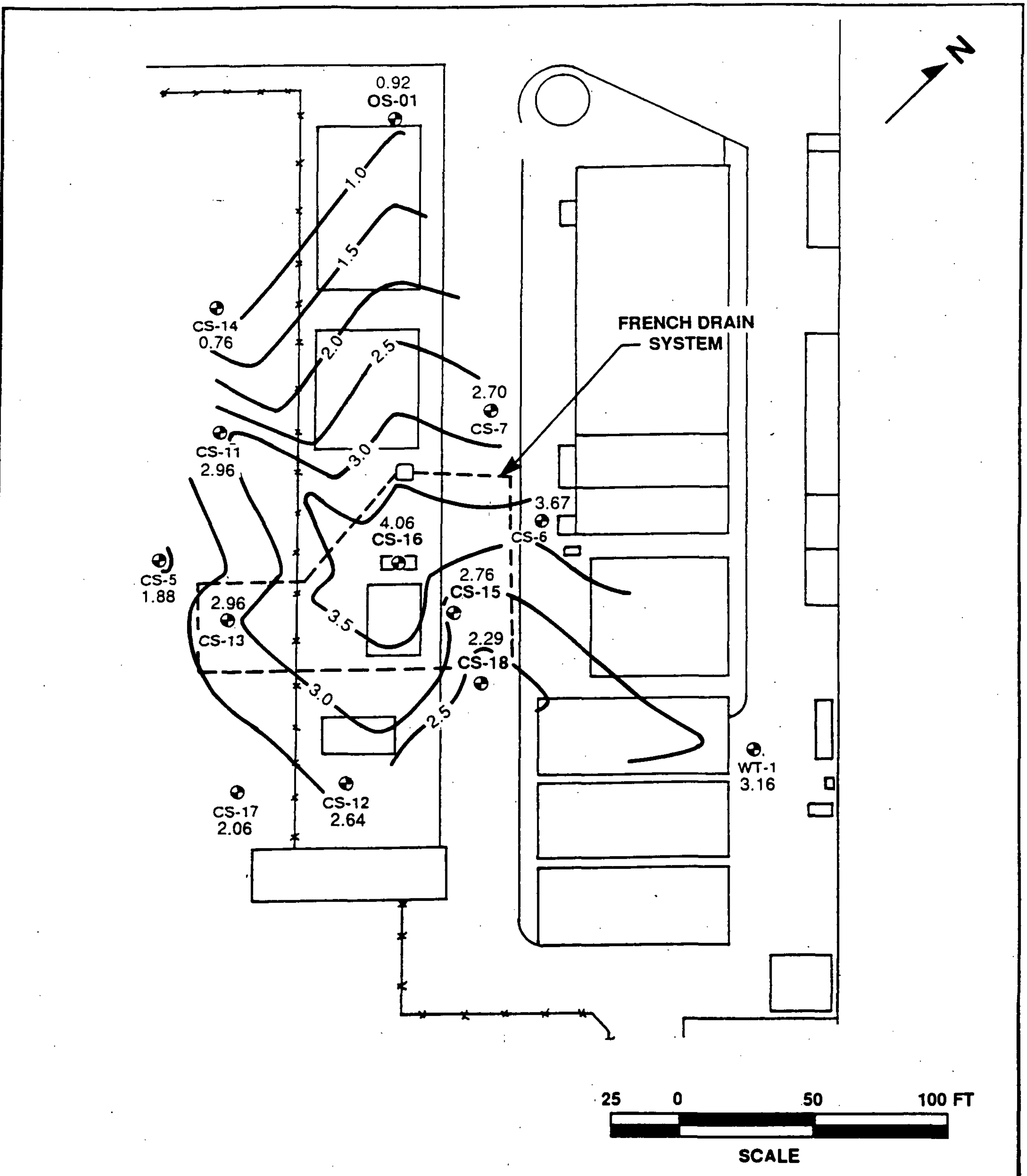
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

SOIL BORING LOCATIONS
IN AREAS 7, 8, 9, AND 10

FIGURE 7

ATTACHMENT E57



CS-5 MONITORING WELL LOCATION AND NUMBER

1.88 GROUNDWATER SURFACE ELEVATION

—3.0— GROUNDWATER SURFACE ELEVATION CONTOUR

CONTOUR INTERVAL = 0.5 FT

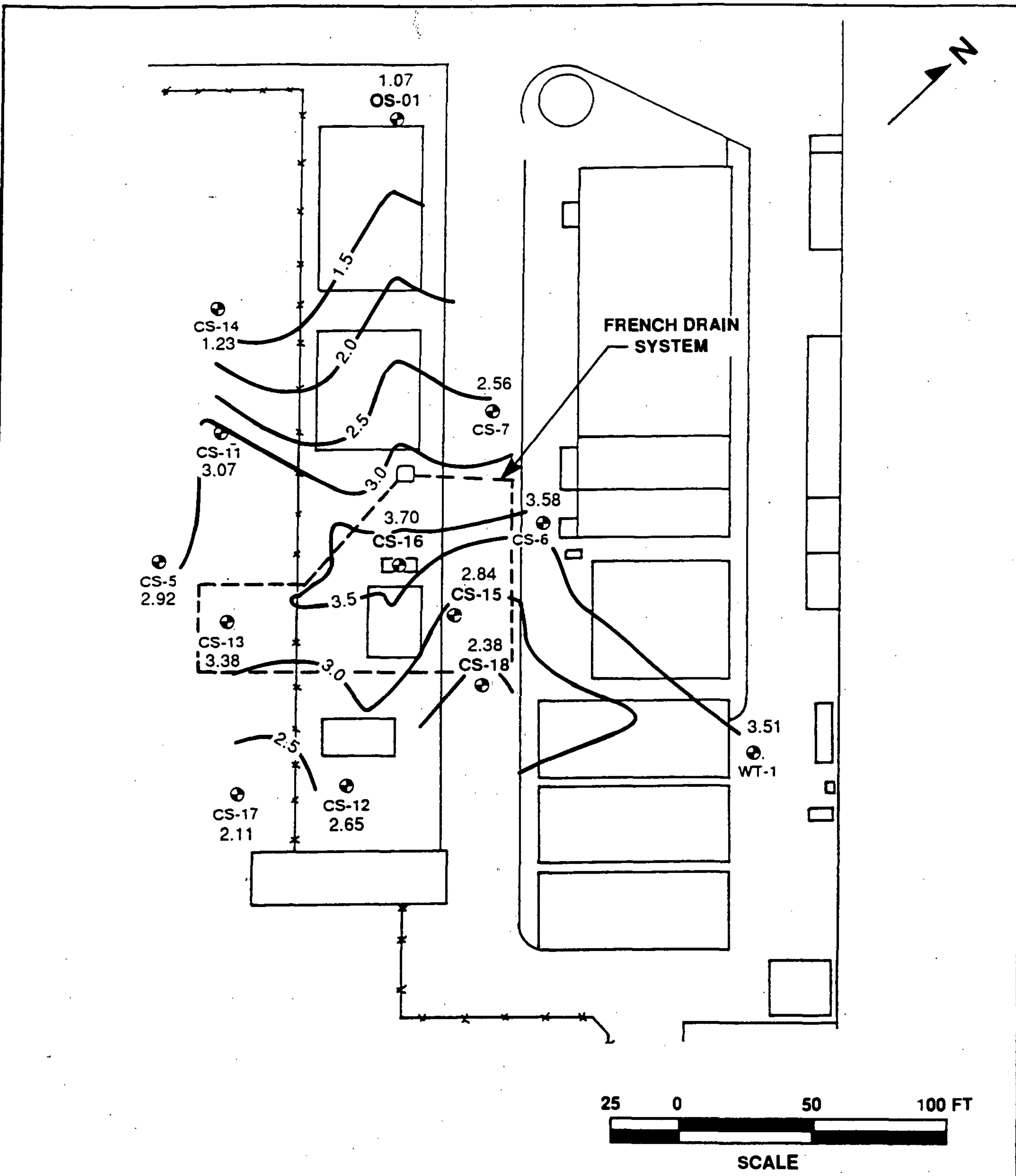
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

PIEZOMETRIC SURFACE
12 APRIL 1990

FIGURE 11

ATTACHMENT E 158



CS-5 MONITORING WELL LOCATION AND NUMBER

2.92 GROUNDWATER SURFACE ELEVATION

—3.0— GROUNDWATER SURFACE ELEVATION CONTOUR

CONTOUR INTERVAL = 0.5 FT

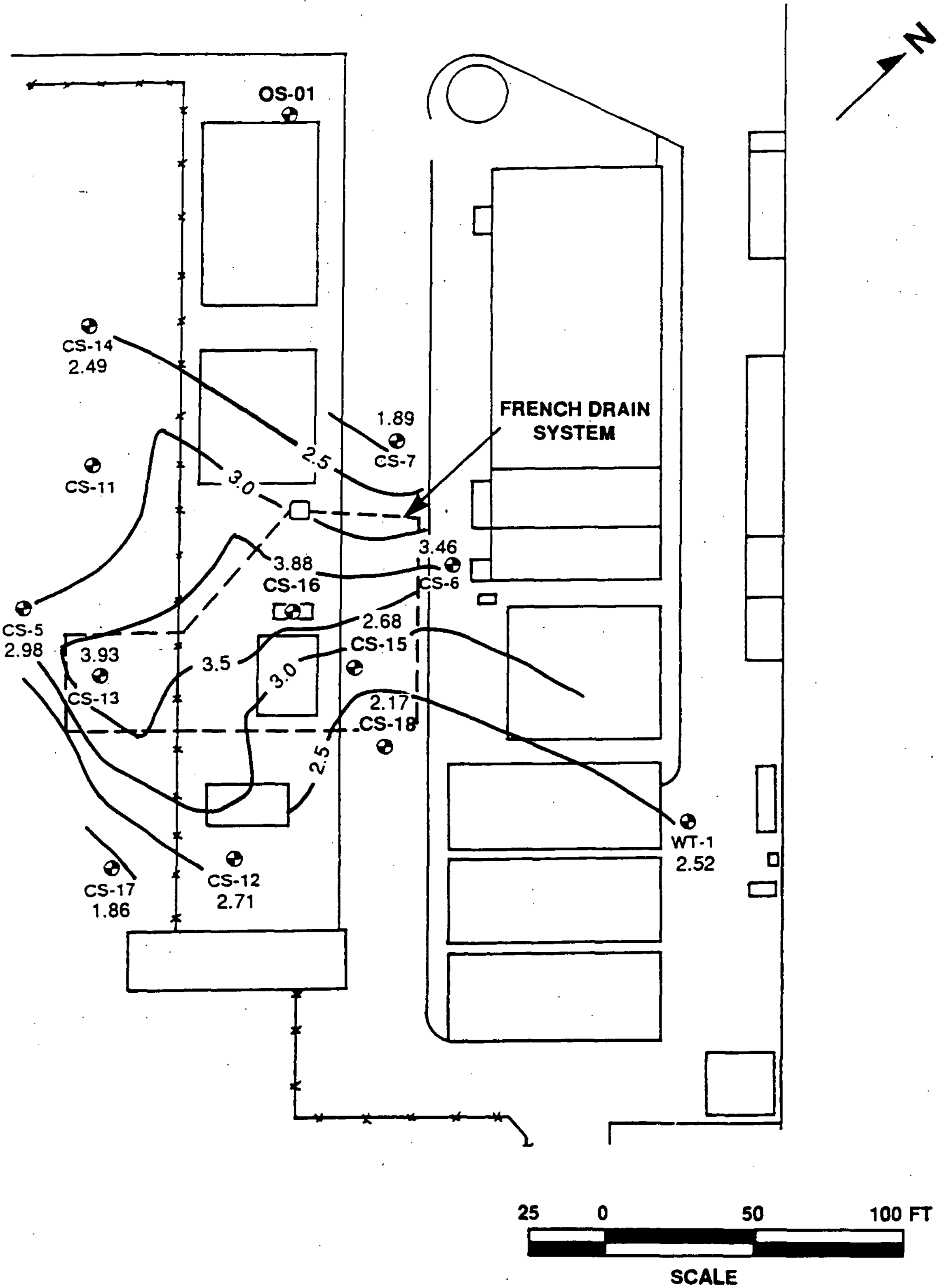
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

PIEZOMETRIC SURFACE
17 APRIL 1990

FIGURE 12

ATTACHMENT F



CS-5 MONITORING WELL LOCATION AND NUMBER

2.98 GROUNDWATER SURFACE ELEVATION

—3.0— GROUNDWATER SURFACE ELEVATION CONTOUR

CONTOUR INTERVAL = 0.5 FT

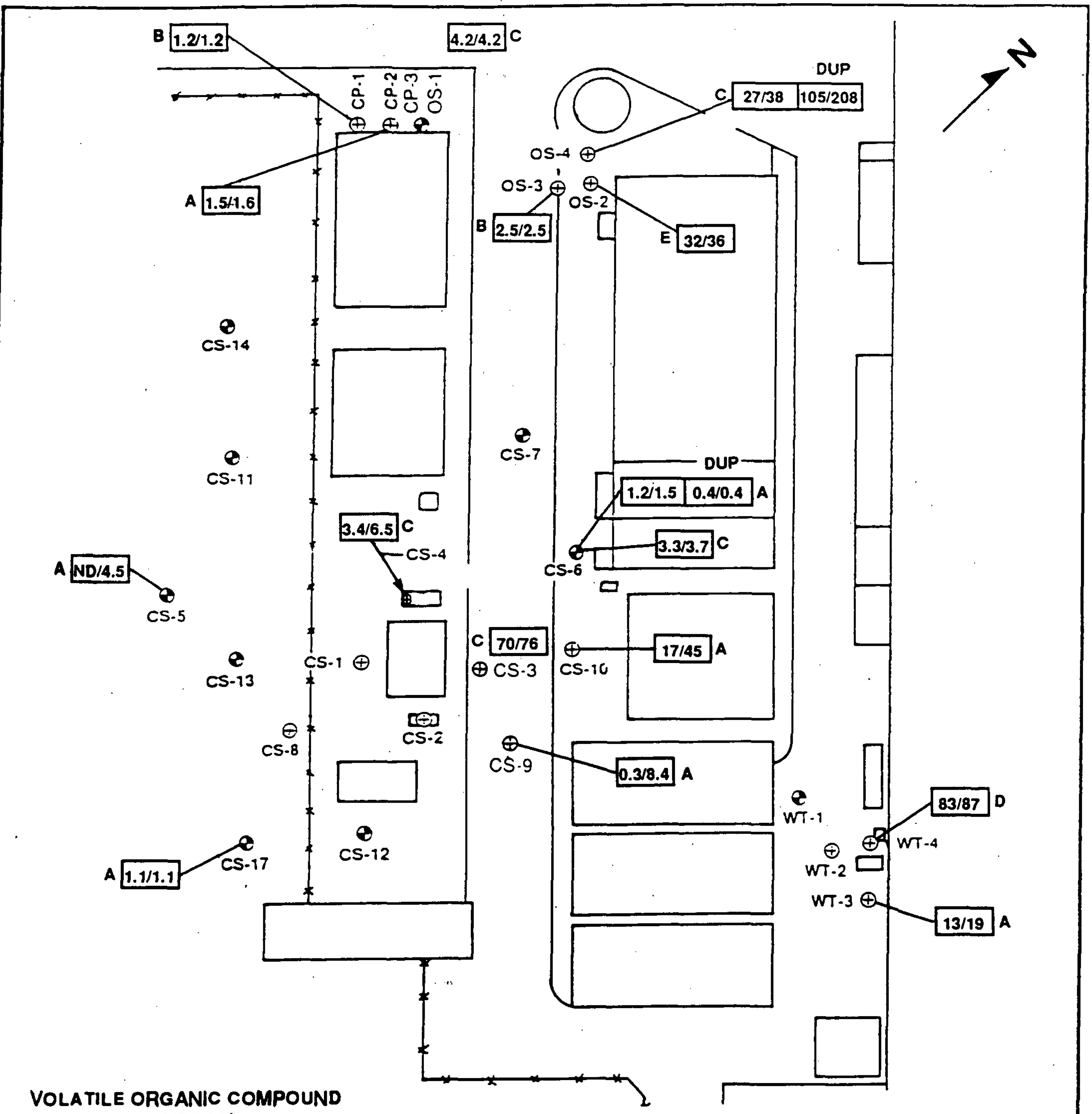
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

PIEZOMETRIC SURFACE
8 MAY 1990

FIGURE 13

ATTACHMENT E160



VOLATILE ORGANIC COMPOUND CONCENTRATIONS

0.3/8.4	VOCs/VOCs + TICS (ppm)
ND	VOCs NOT DETECTED
DUP	DUPLICATE SAMPLE

SAMPLE DEPTH

A	0-2 FT
B	2-4 FT
C	4-6 FT
D	6-8 FT
E	10-12 FT

NOTE: FIGURE INCLUDES DETECTED CONCENTRATIONS >1 ppm (NJDEP ACTION LEVEL)

25 0 50 100 FT

SCALE

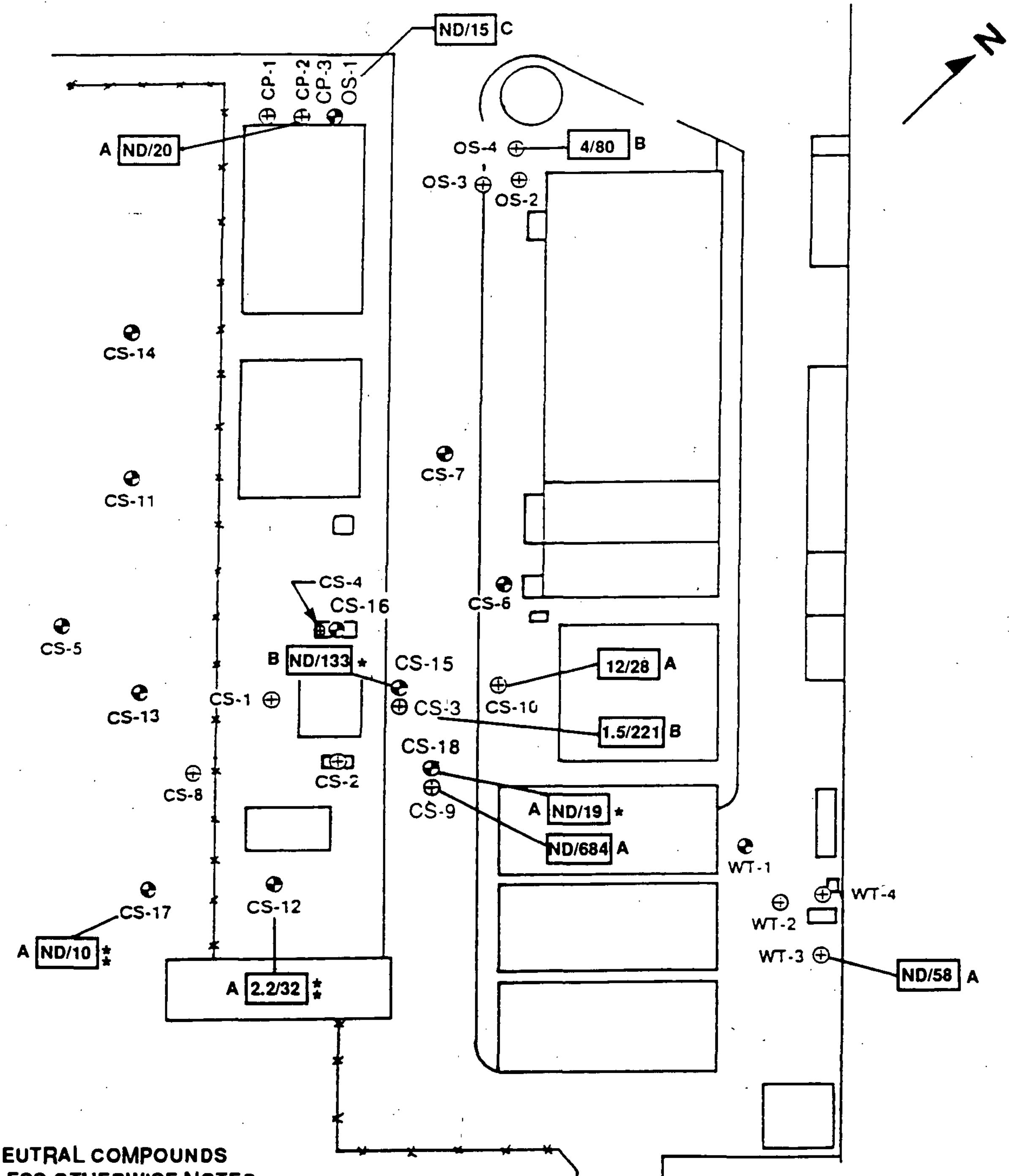
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

VOLATILE ORGANIC COMPOUND CONCENTRATIONS IN SOIL (AREAS 1, 2, 3, AND 5)

FIGURE 14

ATTACHMENT F161



BASE NEUTRAL COMPOUNDS ONLY, UNLESS OTHERWISE NOTED

2.2/32	BNCs/BNCs + TICs (ppm)
*	ACID EXTRACTABLE COMPOUNDS ONLY
**	BNCs + AECs
ND	NOT DETECTED

SAMPLE DEPTH

A	0-2 FT
B	4-6 FT
C	8-10 FT

NOTE: FIGURE INCLUDES DETECTED CONCENTRATIONS >10 ppm (NJDEP ACTION LEVEL)

25 0 50 100 FT

SCALE

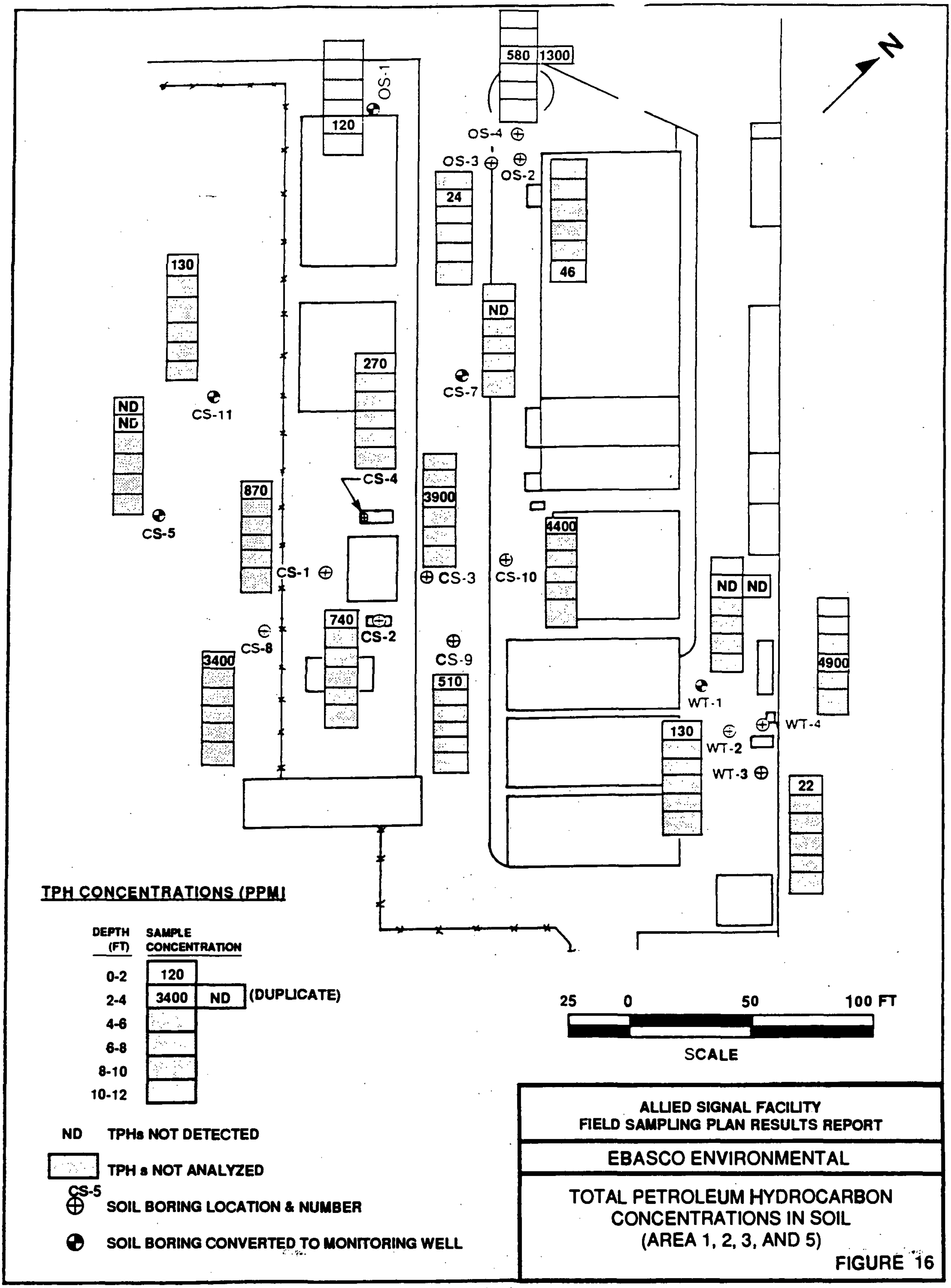
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

SEMIVOLATILE ORGANIC COMPOUND CONCENTRATIONS IN SOIL (AREAS 1, 2, 3, AND 5)

FIGURE 15

ATTACHMENT F162



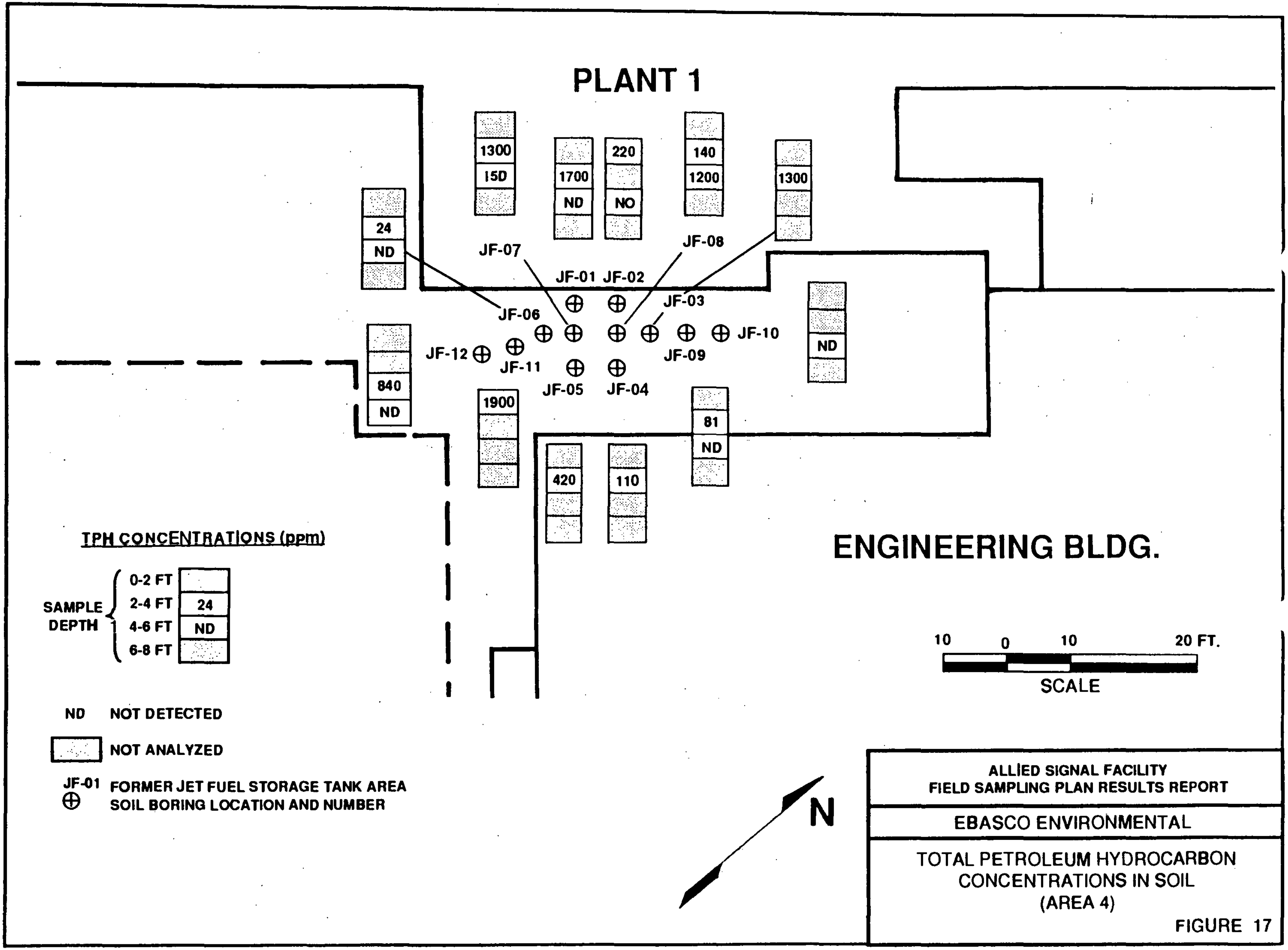
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL (AREA 1, 2, 3, AND 5)

FIGURE 16

ATTACHMENT F163



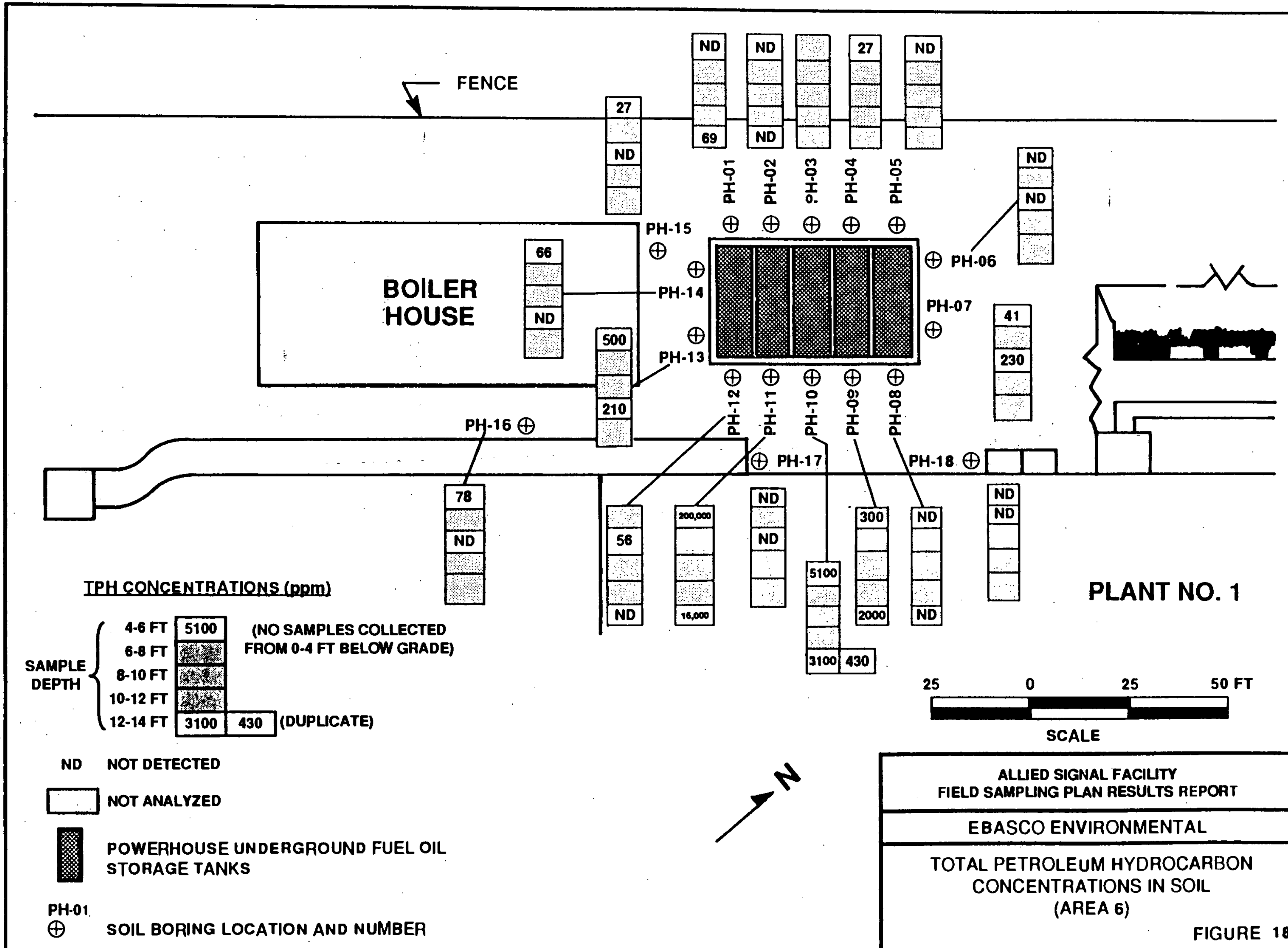
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL (AREA 4)

FIGURE 17

ATTACHMENT F164



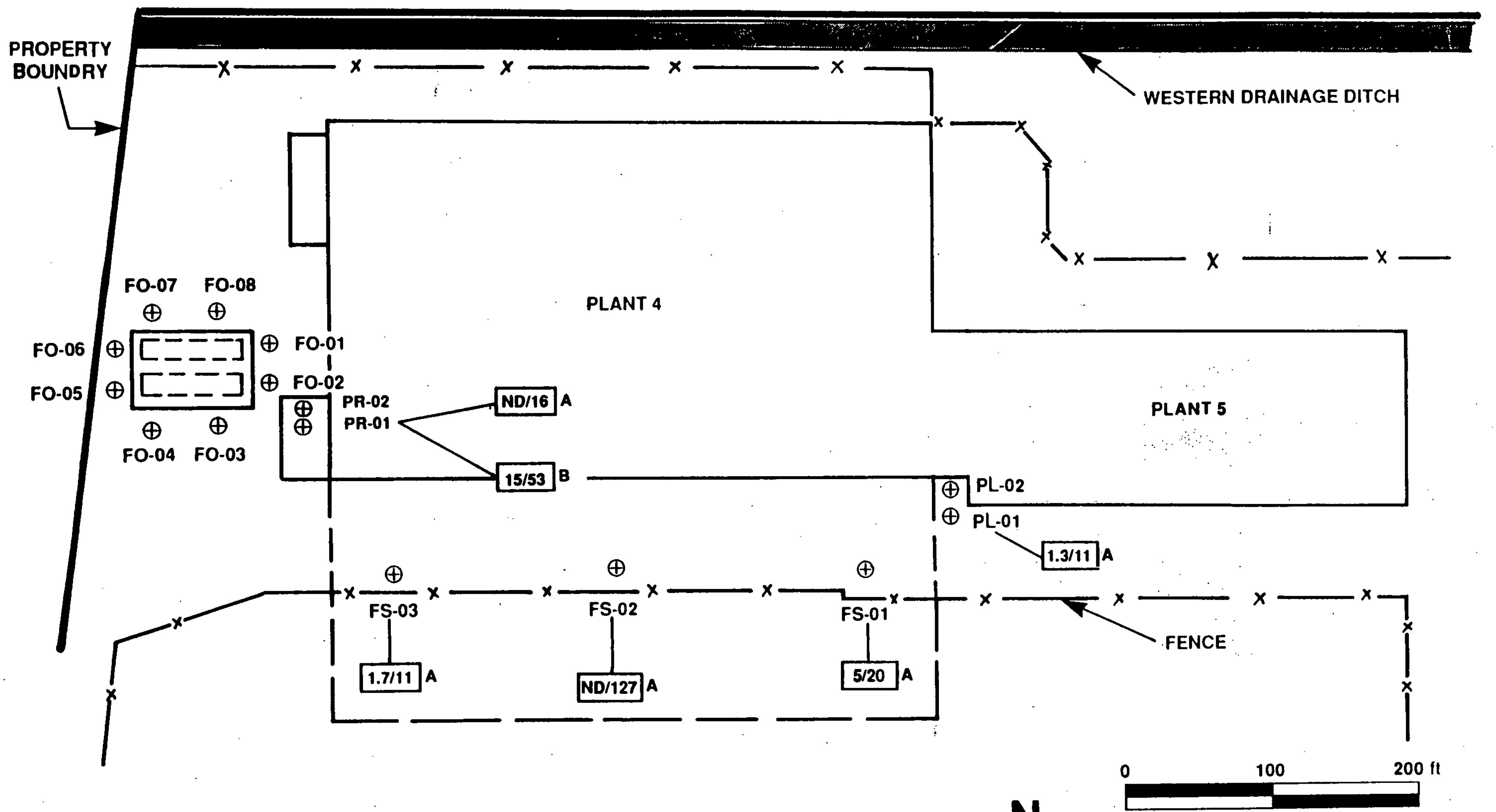
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL (AREA 6)

FIGURE 18

ATTACHMENT E105



BASE NEUTRAL COMPOUND CONCENTRATIONS

1.7/11	BNCs/BNCs + TICs (ppm)
ND	NOT DETECTED

SAMPLE DEPTH

A	0-2 FT
B	2-4 FT

NOTE: FIGURE INCLUDES DETECTED CONCENTRATIONS >10 ppm (NJDEP ACTION LEVEL)

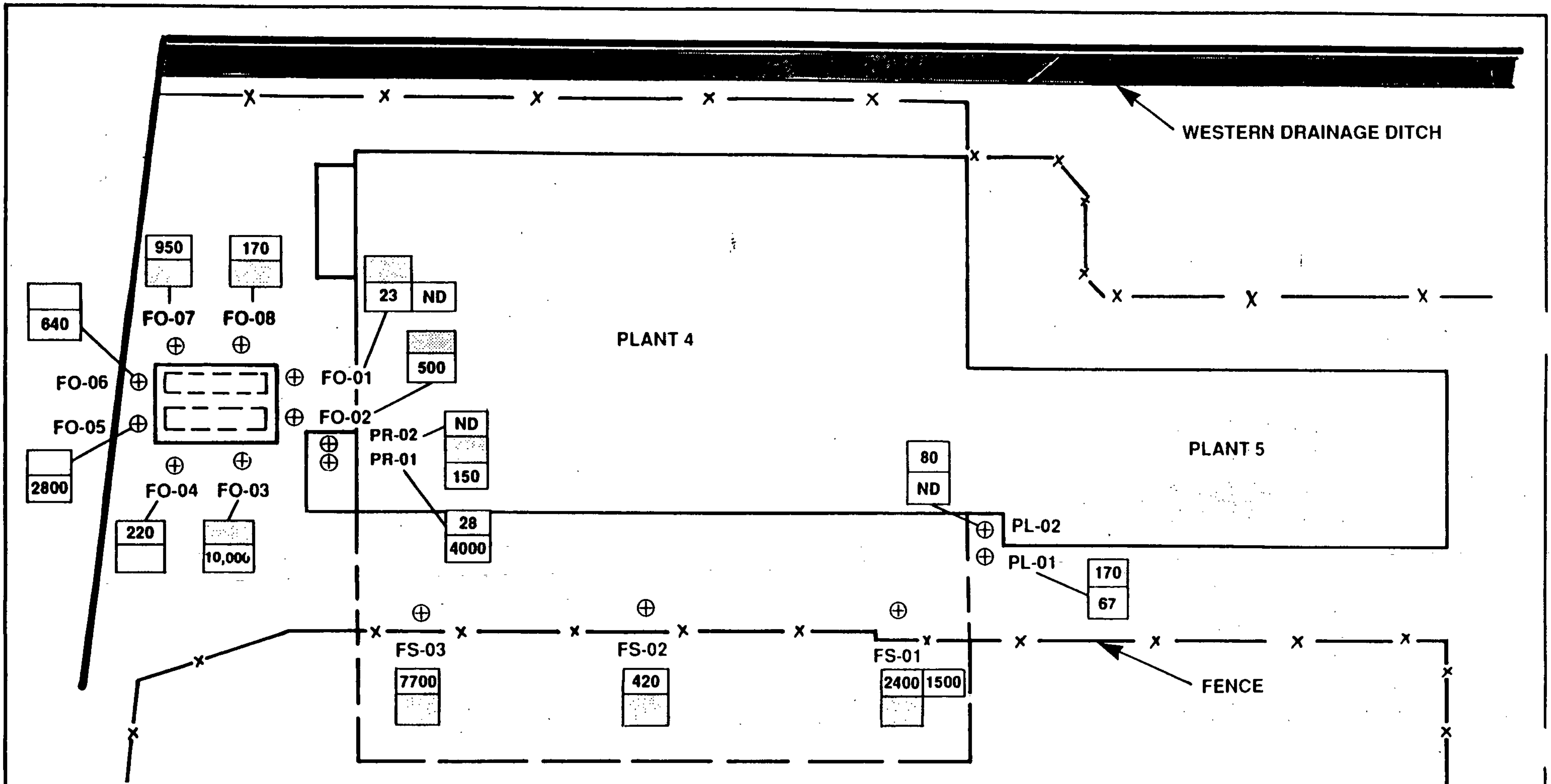
ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

SEMIVOLATILE ORGANIC COMPOUND CONCENTRATIONS IN SOIL (AREAS 7, 8, 9, AND10)

FIGURE 19

ATTACHMENT E



TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS (ppm)

DEPTH (FT)	SAMPLE CONCENTRATION	
0-2	ND	
2-4		1500 (DUPLICATE)
4-6	(PR-02) 150	

ND TPHs NOT DETECTED

TPHs NOT ANALYZED

NOTE: IF MORE THAN ONE SAMPLE WAS ANALYZED FOR TPHs AT ANY GIVEN DEPTH INTERVAL, ONLY THE HIGHEST VALVE IS PRESENTED.

N

0 100 200 ft

SCALE

ALLIED SIGNAL FACILITY
FIELD SAMPLING PLAN RESULTS REPORT

EBASCO ENVIRONMENTAL

TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL (AREAS 7, 8, 9, AND10)

FIGURE 20

ATTACHMENT F167